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TAB. 9024.

FRAXINUS PAXIANA.

China and North India.

OLEACEAE. Tribe FRAXINEAE.

FRAXINUS, L.; *Benth. & Hook. f., Gen. Plant.* II. 676; *Knoblauch in Engl. & Prantl, Nat. Pflanzenf.* IV. 2. 5.

Fraxinus Paxiana, *Lingelsh. in Engl. Bot. Jahrb.* XL. 213 (1907); a *F. floribunda*, Wall., cui proxima et quacum olim confusa erat, foliolis subsessilibus vel breviter petiolulatis et tunc lamina in uno latere ad basin petioluli decurrente distincta. C. Schneid., *Handb. Laubholz.* II. 818 (1912); *Lingelsh. in Sargent, Plant. Wils.* II. 259 (1914) partim; *Arn. Arbor. Bull. n.s.* I. 24 (1912); *Rehd. & Wils. in Sargent, l. c.* II. 623 (1916), III. 450 (1917).
 Syn. *F. floribunda*, Hook. f., *Fl. Brit. Ind.* III. 605 (1882) partim.
F. densiflora, *Lingelsh. in Engl. Bot. Jahrb.* XL. 215 (1907).

This tree is one of the dozen species which, in Eastern Asia, take the place of the manna-ash of Southern Europe and Asia Minor. It inhabits the mountains of Western China from Hupeh to Western and North-western Szechuan, but it also occurs over a wide area in the Himalaya. Griffith found it in Bhutan more than eighty years ago and Falconer collected it in the basin of the Jumna about the same time. The Indian plant was, however, confused from the beginning with the similar *F. floribunda*, a native of Nepal, the Khasia Hills and Burma.* It was not until 1907 that its distinctiveness from *F. floribunda* and its identity with the Chinese tree figured here was recognised by Alexander Lingelsheim. This author proposed at the same time a var. *sikkimensis* of *F. Paxiana*, based on specimens collected by J. D. Hooker in the Lachen valley in Sikkim; but as he omitted to describe it and as Hooker's specimens in the Kew Herbarium come entirely within the range of typical *F. Paxiana* it may be passed over. In China our plant was first collected by A. Henry at Fang in Western Hupeh in August, 1888, whilst E. H. Wilson recorded it from the same province in 1900 and 1901,

* This species is stated to range westwards to Cashmir or even to Afghanistan and Beluchistan. I can find no evidence of this extension, except such as might be deduced from Sir D. Brandis's record of tall trees of *F. floribunda*, planted near temples and villages in the Chenab valley.

and from Western Szechuan in 1903 and again in 1910. Wilson gives its altitudinal range in China as between 2,000 and 2,600 m. In the Himalaya it descends to 1,800 m. in Bhutan (at Chuka, $27^{\circ} 10' N.$, $89^{\circ} 50' E.$) and in the Khasia Hills, if the barren specimens collected by J. D. Hooker at the Jasper Rocks below Mamloo actually represent *F. Paxiana*, still lower; but in Sikkim and Kumaon and farther west it seems to be confined to the levels observed in China. Considering this distribution *F. Paxiana* might be expected to be somewhat tender in this country, but it has so far withstood the winters of Kew and of eastern Ireland—and also the more rigorous climate of the Arnold Arboretum—although it is cut occasionally by early frosts and grows slowly. It has flowered in all these places. The Marquis of Headfort who supplied the material for our plate writes that he bought his plant in 1913 from Messrs. Veitch at Coombe Wood. It was planted out when 1 m. high in a position well sheltered, particularly from the east. It flowered for the first time in the hot summer of 1922 and again this year, although not in such profusion. The plant is now over 3 m. high. He adds that from the size of the panicles he would consider it as one of the finest flowering ashes; but it wants good shelter from wind owing to the brittleness of its wood. The specimen at Kew which was obtained from the same source in 1911 (seed no. 4423 W.) is at present not much over 1.5 m. high and, like that of Headfort Gardens, Co. Meath, Ireland, of a somewhat bushy habit. A botanically interesting feature of the species is its large terminal buds and the correspondingly large sheathing bases of the leaf-stalks. It shares this character with *F. platypoda*, another species of Central China, and also a member of the *Ornus*-section but distinct in its smaller and narrower leaflets and much larger fruits. *F. platypoda* was referred by Lingelsheim to the otherwise exclusively American section *Melioides*; but the material at Kew proves it to be an *Ornus*, whether of the subsection *Eu-Ornus* or of that of *Ornaster*, which differs from *Eu-Ornus* only in the absence of petals, I cannot say, having seen no flowering specimens.

The true manna-ashes (subsect. *Eu-Ornus*) have a wide distribution from the Mediterranean countries

through India and Central Asia to China, Japan and the Malayan region, with a distant outpost (2 species) in northern Mexico and the adjoining states of North America. This points to a still wider range in the northern hemisphere in early tertiary times when, it seems, the group extended as far as Greenland. It is from this ancient group that the true ashes of Eurasia as well as of America have developed by a process of reduction of the flower-bearing branches and in most cases of the flowers themselves.

DESCRIPTION.—A small, or, according to Griffith, tall tree with a loose wide crown and greyish or smoke-brown branches with scattered lenticels which are at first oblong and parallel to the axis, but become roundish in the old bark. *Terminal buds very large, up to 12 mm. long*, at first rusty-pubescent, then becoming glabrous and green without, yellowish-tomentose within. *Leaves* with 3-4, or sometimes 5, pairs of mostly quite glabrous lateral leaflets, the lowest 5-9 cm. from the base of the leaf-stalk; *lateral leaflets sessile or subsessile*, oblong, ovate-oblong or lanceolate, more or less acuminate, crenate-dentate with long low teeth, more or less obliquely rounded at the base or wedge-shaped and *if a short stalklet is present, then produced on one side to its base*, 8-15 cm. by 2.5-5 cm.; leaf-stalk and spindle glabrous, the latter rarely rusty-villous between the uppermost pairs of leaflets. *Panicle* leafy, very loose when fully open, up to 20 cm. by 30 cm.; spindle at first yellowish-villous towards the base, then glabrous; pedicels 2-3 mm. long. *Calyx* campanulate, 1 mm. long, shortly 4-toothed. *Petals* linear-ligulate, 3 mm. long, creamy white. *Anthers* 1-1.2 mm. long. *Fruit* linear-oblong, including the wing 3 cm. by 4-6 mm.

DISTRIBUTION. West China: Hupeh and Szechuan, 2,000-2,600 m. Himalaya: Bhutan to the Jumna, 1,800-2,200 m. Khasia Hills (?). O.S.

Fig. 1, whole panicle, with a leaf in outline behind it, nat. size; 2, a flower, $\times 10$; 3, pistil, $\times 10$; 4, fruit, nat. size; 5, seed, $\times 4$. (Figs. 4 and 5 from Wilson no. 2126.)



TAB. 9025.

HOFFMANNIA ROEZLII.

Mexico.

RUBIACEAE. Tribe HEDYOTIDEAE.

HOFFMANNIA, Swartz; *Benth. & Hook. f., Gen. Plant.* II. 76; *K. Schum. in Engl. & Prantl, Nat. Pflanzenf.* IV. 4. 86.

Hoffmannia Roezlii, Hort. ex Gentil, *Pl. Cult. Serr. Chaud. Jard. Bot. Brux.* 98 (1909); arcte affinis *H. discolori*, Lem. (*Bot. Mag.* t. 4530) et *H. refulgenti*, Hook. (*Bot. Mag.* t. 5346), ab illa foliis sessilibus, i.e. lamina ad eorum insertionem decurrente, pedunculis gracilioribus brevioribusque, sepalis longioribus distincta, ab hac foliis rotundato-obovatis praeter margines et nervos puberulos vel tomentellos glabris, floribus minoribus intense rubris distincta. Syn. *Campylobotrys Roezlii*, Hort. ex E. Reg. in *Gartenfl.* 1868, 116; *Roezl in Gard. Chron.* XXIV. 520 (1885).

Higginsia refulgens, var. *Roezlii*, E. Reg., l. c.

The genus *Hoffmannia* is confined to tropical America ranging from Mexico and the West Indies to Bolivia and Southern Brazil. It comprises about forty-five species, perennial herbs, under-shrubs and shrubs, and one or two of its species are small lanky trees. They are all very uniform in the structure of their flowers, and the more obvious differences by which the species are recognised are in the habit, the shape, size and hairiness of the leaves, the character of the inflorescences, the size of the flowers and the shape of the fruit. Among those of a herbaceous growth a group distinguished by the shortness or stoutness of the four-angled stems and the frequent crowding of the relatively large and beautifully coloured leaves has attracted early attention. The first species of this group to become known was considered by Lemaire (1847) sufficiently specialised to deserve treatment as a distinct genus, *Campylobotrys*, and most of the species added subsequently were at one time or another known under that name in the stoves of continental and English gardens, even after Planchon (1850) had pointed out the generic identity of *Campylobotrys* with the older genus *Higginsia*, Pers. (1805) or *O'Higginsia*, Ruiz et Pavon (1798), a name

which in turn had to give way to the still earlier *Hoffmannia* Sw. (1788). They were all of Mexican origin and brilliant enough to find a place in the pages of this Magazine (see tt. 4530, 5280, 5346, 5383), and they are practically the only representatives of the genus *Hoffmannia* which have ever been in cultivation, the other species lacking the peculiar beauty of the *Campylobotrys* group. Although *Campylobotrys* stands out markedly from the remainder of *Hoffmannia* as far as general appearance is concerned, the flowers of the two sets are so similar, that it seems unjustified to restore the latter to generic rank.

H. Roezlii was collected by Benedikt Roezl, the indefatigable Austrian collector to whom horticulture owes so many introductions, in Mexico—the exact locality is unknown—previously to 1868, in which year Regel described it as a variety of *Higginsia refulgens* with the remark that he had obtained it from Louis van Houtte in Ghent as *H. Roezlii*. It was in cultivation at Kew under the same name in 1878, and more recently under that of *Hoffmannia Roezlii*, Hort., a name revived by M. Louis Gentil in his list of stove plants of the State Botanical Garden at Brussels (1909). The affinity of *H. Roezlii* with *H. refulgens*, a species introduced by Linden from Chiapas, Mexico, about 1850, is very close indeed, but the rough hairiness of the leaves and peduncles of the latter, and its larger flowers contrast sufficiently with the minute and scanty hair-covering and the small flowers of the former to justify their separation as species.

The peculiar sateny gloss of the leaves is due to the papillosity of the upper epidermis whose thin-walled cells project uniformly as low cones and are filled with a colourless watery sap. The colouring on the other hand derives its beauty from the presence of a layer of short palisade-cells packed with large chlorophyll-grains and of a double layer of smaller, looser and roundish cells below them which contain an abundance of anthocyanine with a few grains of chlorophyll. The mixture of reflected and transmitted light which, apart from the position of the leaf towards the light, varies much owing to the puckering of the leaf, determines the different shades of green and the changing play of purple which in combination with the sateny gloss make the foliage

so ornamental. The lower epidermis is also colourless, but its cells are almost flat. It contains at the same time very numerous raised stomata which under the lens resemble minute white pustules on the rose-purple ground of the anthocyanine-layers that shine through the epidermis.

H. Roezlii is grown at Kew—so Mr. W. Taylor, the Assistant-Curator of the Tropical Department, informs me—as a stove-plant in an even moist atmosphere of 15°–21° C. (60°–70° F.). It is kept well shaded from the direct rays of the sun and planted in a compost of equal parts of good fibrous peat and loam with a little sand to render it porous. It may be readily propagated from cuttings at any time of the year.

DESCRIPTION.—A perennial *herb* with an erect or ascending almost glabrous stout stem 4-angled upwards, and 5–7 cm. high. *Leaves* crowded into a rosette, *more or less sessile, rotundate-obovate, glabrous except along the margins and the dorsal nerves which are sparingly downy with minute crisped hairs*, 10–20 cm. by 6–15 cm., elegantly puckered all over, dark green and purplish with a sateen lustre on the face, light purple on the back, stipules triangular, 3–4 mm. long. *Racemes* in scorpoid cymes of up to 10 flowers, borne on red minutely and scantily hairy stalks 2–4 cm. long. *Flowers dark-red*, sessile or the lowest shortly stalked, supported by minute downy bracts, disarticulating at the base, if not fertilized, and leaving circular scars. *Receptacle* obconical-oblong, 4 mm long. *Sepals* lanceolate, acuminate, *up to 3 mm. long*, sparingly rusty-hairy to glabrous. *Corolla-tube hardly 2 mm. long*; *lobes* linear-lanceolate, somewhat blunt, *up to 1 cm. long*. *Anthers* white, almost sessile in the mouth of the corolla-tube, 5–6 mm. long. *Style* 8 mm. long, papillose; stigmas ovate, slightly over 1 mm. long.

DISTRIBUTION.—Mexico, exact locality unknown.

O.S.

Fig. 1, a flowering branch, nat. size; 2, a part of a young stem with leaf-bases and stipules, nat. size; 3, part of a corolla, $\times 4$; 4, anther in back view, $\times 4$; 5, longitudinal section through receptacle and calyx with pistil, $\times 4$.



TAB. 9026.

PRIMULA BULLEYANA.

West China.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA, L.; *Benth. & Hook. f., Gen. Plant.* II. 631; *Pax in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 104, et in *Engl. Pflanzenr.* IV. 237, 17.

Primula Bulleyana, *Forrest in Not. Bot. Gard. Edinb.* IV. 231 (1908); affinis *P. Cockburnianae*, Hemsl., sed robustior et foliis 15–30 cm. longis, scapis ultra 50 cm. altis, calycis dentibus subulato-acuminatis, corolla aurantiaca vel in alabastro fusco-coccinea diversa.—*Gard. Mag.* LII. 403 with fig. (1909); Balf. f. in *Gard. Chron.* XLVI. 15, figs. 9–11 (1909); E.B. in *Journ. Roy. Hort. Soc.* XXXV. 557 (1910); XXXIX. 166, fig. 77 (1913).

This handsome and promising primula, one of the “*Candelabra*” set of which the late Professor I. B. Balfour aptly said that “they are the plants of everybody,” was in 1906 discovered by Mr. Forrest in moist mountain meadows on the eastern flank of the Lichiang range in Yunnan at an altitude of 3,000 to 3,300 m. (No. 2440), and it was introduced into cultivation by Mr. A. K. Bulley of Ness, Neston, Cheshire, for whom Mr. Forrest was then collecting. Camillo Schneider has since established its presence in Southern Szechuan. *P. Bulleyana* was first recorded as flowering in this country in 1909 and it may now be considered as well established. It is easy to grow where there is water, particularly in partially shaded soil which is well drained and rich in humus. Under favourable conditions the flowering scapes rise to a height of over 1 m. and carry as many as 7 tiers of flowers whose successive opening may be spread over several weeks. It seeds freely and crosses readily in the natural state as well as in cultivation. The difficulty of referring definitely some of Forrest’s and Schneider’s field-specimens to *P. Bulleyana* is probably connected with this propensity for hybridisation.

Balfour's "*Candelabra*" group corresponds to Pax's section *Cankrienia* (1905) excluding the last four species of his enumeration, and to the bulk of his earlier section *Proliferae* (1889), both resting on *P. imperialis*, a candelabrum-primula of Java, described by De Vriese (1850) as *Cankrienia chrysantha*; technically therefore the name *Proliferae*, being the earliest sectional name, will have to be retained in preference to Balfour's name *Candelabra* (1913). The latter is, however, so descriptive that in ordinary parlance we may continue to speak of "candelabrum-primulas." Balfour, in his paper "On Chinese and other Primulas" read at the Primula Conference in 1913, referred 15 species to the section in question. Others have been added since so that it comprises now over 25 species, ranging from Szechuan to Sikkim and Japan and southwards to Java, all very similar in habit and in the structure of flower and fruit. Many are in cultivation and they are with rare exceptions quite hardy. Four have so far been figured in the Botanical Magazine, namely *P. japonica* (t. 5916), *P. Poissonii* (t. 7216), *P. imperialis* (t. 7217) and *P. anisodora* (t. 8752). The drawing from which the present plate was prepared was originally made for Professor Balfour in 1919 from a plant grown in the Botanic Garden at Edinburgh. It was, like others of a similar origin, placed at our disposal by the unvarying courtesy of his successor.

DESCRIPTION.—A stemless, almost glabrous perennial herb. Leaves 7 to 9, all basal, broadly oblanceolate or oblong, blunt, long attenuated into a short leaf-stalk, serrate-dentate along the margin, 15 to 30 cm. by 5 to 10 cm., green and quite glabrous except for very minute club-shaped hairs on the back, resembling a fine powder; nerves in 12 to 18 pairs which are, like the mid-rib, more or less red. Scape stout, usually 40 to 70 cm. high, slightly mealy upwards, bearing 2 to 7 many-flowered tiers of flowers which are ultimately 10 to 5 cm. distant from each other; bracts filiform, up to 2.5 mm. long; flower-stalks mealy upwards 5–12 mm. or after flowering up to 20 mm. long. Calyx tubular to bell-shaped 6–9 mm. long, 5-cleft to the middle, green, slightly mealy without,

densely mealy within ; lobes awl-shaped from a wider base or almost lanceolate with a callous tip. Corolla-tube differing in the long- and the short-styled forms as shown in figs. 2 and 3, 12 to 13 mm. long, bright reddish without ; limb as shown in the picture, 15 to 20 mm. in diameter, orange-coloured or in the bud dull scarlet.* Anthers subsessile, up to 2 mm. long. Stigma capitate. Capsule subglobose, 5 mm. long, slightly exceeding the widened calyx-tube.

DISTRIBUTION.—China. Yunnan ; Lichiang range and northwards to the Szechuan frontier and slightly beyond it. O.S.

Fig. 1, a leaf-tuft and a flowering scape (cut), nat. size ; 2, a longitudinal section of a pin-eyed flower, $\times 2$; 3, a longitudinal section of a thrum-eyed flower, $\times 2$; 4, mouth of a thrum-eyed flower, $\times 2$; 5, anthers, $\times 7$; 6, a fruiting calyx, nat. size ; 7, a capsule, nat. size.

* Other specimens (No. 2449) collected by Forrest about the same time and in the same mountain range slightly farther south are described by him as having " flowers rich and pale rose, crushed strawberry-shade." They have the appearance of *P. Bulleyana* but for the colour which may be due to the intervention of foreign pollen or merely to the preponderance of the red over the yellow colouring matter.



TAB. 9027.

BUDDLEIA FARRERI.

China.

LOGANIACEAE. Tribe BUDDLEIEAE.

BUDDLEIA, Linn.; *Benth. & Hook. f., Gen. Pl.* II. 793; *Solereder in Engl. & Prantl, Nat. Pflanzf.* IV. 2. 46.

Buddleia Farreri, *Balf. f. et W. W. Smith in Notes Bot. Gard. Edinb.* IX. 84 (1916); affinis *B. agathosmae*, Diels, sed foliis longius petiolatis facie mox glabrescentibus, absentia stipularum interpetiolarium rotundarum, calycibus minoribus, corollae tubo extra glabro distincta.—Farrer, *On the Eaves of the World*, II. 319 (1917).

“This noble bush of 4–6 ft., with ample boughs of huge flannelly foliage, hugs only the very hottest and driest crevices, cliffs, walls and banks down the most arid and torrid aspects of the Ha Shiu fang (about Siku) and the baking stony defiles of the Feng S'an Ling (S. side). It does not range northward, and the flowering specimen was gathered from a strange outlying colony at the edge of subalpine coppice below Chago, in the Satanee Valley on 8th May. These magnificent thyrses appear before the leaves, which afterwards unfold to hide all trace of them; they suggest a glorified *Veronica Hulkeana* on a big scale, and have the most delicious scent of raspberry ice.”

With these words Reginald Farrer introduced the plant figured here to his horticultural friends (see *Not. R. Bot. Gard. Edinb.* I. c.) nor is he less enthusiastic about it in his “On the Eaves of the World” where he calls it “the pride of the blazing rocks and cliffs” (I. 148) and a “spectacle of singular beauty” (I. 191). Although the praise Farrer bestows on the plant may appear exaggerated to us who have not the benefit of seeing it in its natural setting it will be admitted that *B. Farreri* is one of the most interesting additions to the ever increasing list of buddleias which we have received from the East during the last twenty years.

The Index Florae Sinensis (up to 1904) enumerated 7 or 8 species (after correction) for China. To-day we count five or six times as many from the same area and not a few could be added from the unworked herbarium material. Most of the Chinese buddleias are natives of Yunnan; about 8 are recorded from Central and West China and 3 from Kansu. The latter along with the one or two Japanese species are the northernmost outposts of this large essentially tropical genus which in the Old World ranges from Eastern Asia through India to East Africa and Madagascar and in a few species even to temperate South Africa, and in the New World from Nevada, Arizona and Texas to temperate South America. Very uniform in the structure of its flowers and fruits it has always offered great difficulties to a natural classification, and the grouping of its species by the shape of the corolla and the habit of the inflorescences which Bentham proposed almost eighty years ago is still the only attempt at a comprehensive taxonomic treatment of the genus. Adopting his system, we shall have to place our species in the subsection *Macrothyrsae* which is confined to Asia and Abyssinia. Within this it clearly approaches among the better known species, *B. officinalis*, a native of Central China. The peculiar shape of the leaves, however, marks it out as a very distinct deviation from the usual type, repeated only in Diels' *B. agathosma*, a native of Yunnan, and in two undescribed species from Yunnan and Szechuan respectively. From *B. agathosma* it differs in the thinner more evanescently hairy leaves, in the absence of large rounded stipules and in the smaller calyx and the externally glabrous corollas.

The plant figured here was sent to Kew as a small seedling by Mr. Farrer himself in 1918 with his number F. no. 44. It was planted out of doors in the summer of 1920, but was moved into the Temperate House at the end of 1922 when it showed signs of flowering. It is given a soil of loam and sand. Mr. C. P. Raffill tells me that the delicious scent which the flowers emit varies in intensity during the day, and also that the corollas were a little darker in colour when produced out of doors.

Other specimens are grown on the outside of the Temperate House and against a wall in the Cambridge Cottage Garden. They are now 2 m. and 3 m. high and the young foliage has the exquisite "flannelly" appearance of which Farrer speaks, the "flannel" being formed by a thick layer of very fine hairs with tiers of horizontally spreading unicellular branches. One of these plants has flowered and fruited abundantly this year. The fruit and the seed are described below, but they came too late to be represented in the plate.

DESCRIPTION.—A *shrub* up to over 2 m. high with round or slightly compressed branches which when young are, like all other parts of the plant, covered with a soft white felt, but become sooner or later glabrous, showing a brown smooth bark. The felt consists of branched hairs 0·5 to over 1 mm. long with very fine spreading branches arranged in 2 to 7 tiers. *Leaves* opposite, very variable in size and shape, the lowest of a year's growth usually like the lowest leaves shown in fig. 1, the following being in outline like the large leaf of the same figure, or having a more truncate or hastate base and a coarser double toothing and longer stalks (2·5–5 cm. long) whose wings widen out downwards and join across the stem into a shallow cuff with more or less recurved lips; the upper leaves, particularly of the long shoots, oblong-lanceolate from a cordate base, more gradually tapering upwards, rather crenate than dentate, with wide and mostly entire minutely apiculate crenae, up to 30 cm. by 11 cm., with terete wingless stalks up to 5 cm. long and 5 mm. in diameter, all becoming ultimately more or less glabrous and green on the upper side; nerves 7–10 pairs on each side, sunk on the face, raised on the back. *Panicles* terminal, stiff, up to 20 cm. long with a stout ultimately glabrescent rhachis; branches stiff, up to 5 cm. long, bearing 3–5- (sometimes up to 12-) flowered very shortly stalked capituliform cymes, supported by deciduous linear-lanceolate bracts, up to 1 cm. long; flower-stalks slender, up to 1 mm. long, with minute bracteoles. *Calyx* tubular, including the 4 broad ovate teeth 2 to 2·5 mm. or ultimately to 3 mm.

long, minutely hairy. *Corolla-tube* slender, 7 to 8 mm. long, quite glabrous without, reddish with a golden-yellow throat; limb spreading 5–6 mm. in diameter, pale rose-lilac with 4 roundish segments. *Anthers* inserted above the middle of the tube, 0.75 mm. long. *Ovary* subglobose, whitish-tomentose above the green base; style 3 mm. long with a cylindric slightly stouter stigma. *Capsule* oblong, finely greyish-downy, about 5 mm. long; valves slightly gaping, acute. *Seeds* elliptic in outline, winged around the pale brown nucleus, including the wing, 1 mm. long.

DISTRIBUTION.—China, Southern Kansu, around Siku, at about 1,350 m. O.S.

Fig. 1, a young shoot, nat. size; 2, an inflorescence, nat. size; 3, a flower, $\times 6$; 4, a calyx, opened out, $\times 6$; 5, a corolla, seen from above, $\times 6$; 6, a longitudinal section of a corolla-tube with anthers and pistil, $\times 6$; 7, an anther, $\times 20$; 8, a 2-tiered hair, $\times 30$.

TAB. 9028.

STELLERA CHAMAEIASME.

Central Asia.

THYMELAEACEAE. Tribe GNIDIEAE.

STELLERA, Gmelin ex L. ; *Benth. & Hook. f., Gen. Plant.* III. 193 ; *Gilg in Engl. & Prantl, Nat. Pflanzenf.* III. 6a. 241.

Stellera Chamaeiasme, *Linn. Spec. Plant.* 559 (1753) ; affinis *S. altaicae*, Thiebaud, sed capitulis globosis involucretis, floribus 5-meris, sepalis multo brevioribus plane distincta. C. A. Meyer in *Bull. Acad. Petr.* I. 359 (1843) ; Meisn. in *DC. Prodr.* XIV. 549 (1856) ; Turcz., *Fl. Baical.* II. 1. 73 (1856) ; Maxim., *Prim. Fl. Amur.* 237 (1859) ; Freyn in *Oest. Bot. Zeit.* XL. 222 (1890) ; XLVI. 58 (1896) ; Hemsl. in *Journ. Linn. Soc.* XXVI. 401 (1894) ; Komarow, *Fl. Mansh.* III. 81 (1907).
Syn. Passerina Stelleri, Wikstr. in *Act. Holm.* 1818, 321 ; Ledeb., *Fl. Ross.*, III. 546 (1846-1851).

Chamaeiasme Stelleri, O. Kuntze, *Rev. Gen.* ii. 584 (1891).

Although known for a very long time and offering no greater difficulties to cultivation than most genera of *Thymelaeaceae*, as for instance *Daphne*, *Stellera* is rarely seen in gardens and none of its species has so far been figured in the Botanical Magazine. It is a small genus, almost entirely confined to the drier parts of temperate Asia from Persia and the Caucasus to China and from the Altai and Transbaicalia to the inner ranges of the Himalaya. It was originally called *Chamaeiasme* by its discoverer Joh. Georg Gmelin,* but it was subsequently (1747) renamed *Stellera* by C. M. Dassow on the authority of Gmelin himself to commemorate the work of Georg Wilhelm Steller. This naturalist was like Gmelin one of the numerous German explorers who in the service of the Russian czars laid the foundation to our knowledge of their vast possessions in Eastern Asia, and he had died only the year before. Eventually the genus passed into Linnæus's *Genera Plantarum* (1754 ; ed. V.) and the *Species Plantarum* (ed. I. 1753) and became thus established. Unfortunately Dassow and Linnæus coupled

* Gmelin in Amman., *Stirp. Ruth. Ic. et Descr.* 16-18 (1739).

Gmelin's original *Chamaeiasme* with a species of another genus (*Thymelaea*) which led to much confusion in the subsequent literature, until in 1843 C. A. Meyer in a revision of the *Daphneae* defined *Stellera* in the sense of Gmelin's *Chamaeiasme* as it is recognized at present. Gmelin says that he took the name *Chamaeiasme* from earlier writers who had applied it to other small sweet-scented plants. It originated in fact with Conrad Gesner who wrote on a sheet of *Androsace Chamaeiasme* in Joh. Bauhin's herbarium "a flower of the summits of the mountains, very sweet-scented when fresh; hence its name Chamae-Iasme" (from the Greek χαμαί, on the ground—hence in plant names low, dwarf—and ιασμή, the name of a Persian scent which recurs in the Arabic "yasmin," that is our Jasmine).

S. Chamaeiasme is a common constituent of the vegetation of the grassy and rocky slopes of the Transbaicalian mountains where Gmelin found it flowering abundantly in July. Thence it ranges south-east to the Yalu on the Korean frontier and south far into western China and Tibet and the inner Himalaya of Kumaon and Garhwal, always keeping to high ground and open situations. Möllendorf found it west of Peking at 2,200 m.; Farrer saw it in the Min shan, on the frontier of Kansu and Szechuan, as it "stood up from the cropped grass in myriads of round-headed tiny bushes bearing pink flowers"—see his charming picture of a group of bushes in "On the Eaves of the World," facing p. 104; Pratt and Wilson and others recorded it from the mountains of Tachienlu (up to 3,900 m.); Younghusband and others collected it in the South-Tibetan highland; Wollaston in the valley of the Dzaka Chu on the north foot of Mount Everest, and Capt. Thorold who accompanied Col. Bower on his expedition through the barren wastes of western Tibet remarks that it is one of the commonest plants of that forbidding region. In Kumaon and Garhwal it appears in a broad-leaved form with more hairy ovaries which has been described as *S. hypericifolia* and as *S. concinna*, but it is doubtful whether it is genetically separable from the typical state, as broad-leaved plants have been collected repeatedly among the ordinary narrow-leaved form and the ovaries of the Tibetan specimens show a considerable variation in hairiness. In

Yunnan, however, it is represented by a really distinct species with fine balls of golden-yellow scentless flowers carried on slender stems very like those of our plant. This is still undescribed, but it deserves attention.

The plant from which the present plate was prepared was one of several which were raised by Major F. C. Stern in his garden at Highdown, near Goring-on-Sea, Sussex, from seed collected by Farrer in the Minshan in 1914 (no. F. 93). Major Stern writes: "It has been planted out in the rock-garden in an eastern aspect and grows up and flowers every year. The scent is very like that of *Daphne Cneorum*. The plant has been out in the rock-garden several years without protection." It fruits and a plant has been raised from seed, but he has so far not succeeded in propagating it in any other way.

It may be added that the plant is poisonous, and the root-stock, which in old individuals attains considerable dimensions is used, as Gmelin has already observed, as a drastic purgative and an emetic.

DESCRIPTION.—A perfectly glabrous *shrublet* which produces numerous slender leafy upright annual shoots 15–40 cm. high from a woody root-stock. *Leaves* almost sessile, very variable in shape, linear-lanceolate to elliptic-oblong, obtuse or wedge-shaped at the base, more or less pointed at the apex, 1.5 to 2 cm. by 2.6 to 5 mm., green or slightly glaucous, *the uppermost crowded below the flower-head into an involucre*. *Flower-heads* globular, many flowered, 2.5 to 3.5 cm. in diameter. *Receptacle* tubular, more or less pink, 10 to 13 mm. long, disarticulating above the ripe fruit. *Sepals* (perianth-lobes of some authors) 5, rarely 4, elliptic, blunt, *forming a white or slightly pinkish limb, up to 8 mm. across*. *Petals* none. *Stamens* 10, 5 just above the middle of the tube and 5 in the throat, with very short filaments and yellow anthers, 1 mm. long. *Ovary* ellipsoid to ellipsoid-oblong, mostly very minutely hairy near the top and with a linear gland at the base; style short, stigma capitate. *Fruit* a small blackish nut, enclosed in the dry persistent base of the receptacle. O.S.

Fig. 1, flowering stems, nat. size; 2, a flower, $\times 6$; 3, the same in longitudinal section, $\times 6$; 4, stamens, $\times 8$; 5, a pistil, $\times 6$.



TAB. 9029.

LINDMANIA PENDULIFLORA.

Peru.

BROMELIACEAE. Tribe PUYEAE.

LINDMANIA, Mez in *Cas. DC.*, *Mon. Phan.* IX, 535 (1896); Wittmack in *Engl. & Prantl*, *Nat. Pflanzenf.*, *Nachtr.* 68.

Lindmania penduliflora, Stapf (*nov. comb.*); affinis *L. neogranatensi*, Mez; sed foliis apicem versus minus longe attenuatis, floribus laxè dispositis longioribus longius pedicellatis, bracteis minoribus distincta.

Syn. *Catopsis penduliflora*, C. H. Wright in *Kew Bull.* 1910, 197.

The taxonomy of the *Bromeliaceae* is so largely based on seed-characters that it is difficult in the absence of mature fruits to place physiognomically aberrant forms. This no doubt accounts for the original inclusion of the plant figured here in *Catopsis*, a member of the tribe *Tillandsieae*. The fact that it has until recently been impossible to obtain fruits and seeds of it also explains the omission of corresponding figures in our plate, which was prepared early in the year from specimens communicated to us by Professor W. Wright Smith of Edinburgh. One of them has, however, since fruited at Kew and produced good seeds which have been very helpful in ascertaining its true affinities. These lie with some Andine species of the little known genus *Lindmania* and especially as it seems with *L. neogranatensis*. *Lindmania* was proposed by Professor Carl Mez of Koenigsberg in his elaborate monograph of the *Bromeliaceae* (1896). It is so far known to comprise eight or ten species, six Andine (Colombia to Bolivia), one from the frontier of British and Dutch Guiana and the rest from the Argentine (Jujuy and Catamarca). The characters in which *L. penduliflora* differs from *L. neogranatensis* have been stated in the differential diagnosis given above and they are italicized in the description at the end of this article.

L. Weberbaueri, a Peruvian species, which I know only from description, also seems to be very similar, but it has much smaller flowers (5 mm. long). The only *Lindmania* which has so far been figured at all is *L. brevifolia*, an Argentine plant which forms cushions resembling those of an *Azorella*. It may, however, have to be accepted, as Hauman has pointed out, as the type of a distinct genus. *L. penduliflora* is perhaps more interesting for the botanist than the horticulturist, but its graceful inflorescence and its free flowering and seeding will always justify its inclusion among our stove-plants.

Professor W. Wright Smith informs me that he received the plant accidentally from Messrs. Sander & Sons, St. Albans, in March, 1910, along with a mixed consignment of Peruvian plants. It was then quite small and adhered to the stem of an unnamed aroid. The plant also flowered in the same year with Messrs. Sander & Sons who sent a specimen to Kew, and this was subsequently described as *Catopsis penduliflora*. According to Messrs. Sander & Sons it was collected by M. Forget in Peru. It may be like so many *Bromeliaceae* an epiphyte, but its immediate allies are terrestrial plants growing on the edges of forests. They are described as monocarpic and the individual figured here has, I am told, died after fruiting. Professor W. Wright Smith, however, speaks of it as being easily propagated by division, and there were indeed young suckers present when the plant was received. It requires good open compost, but may otherwise be treated like other *Bromeliaceae*.

DESCRIPTION.—The following may by way of description and in distinction from the allied species be added to the characters represented in the plate. A *perennial*, reproducing itself from suckers. *Rosette of leaves* annual with the flowering scape terminal from the centre. *Leaves lanceolate-linear, rather shortly acuminate* with a fine soft point, the longest up to 25 cm. by 3.5 cm., herbaceous with a fine perfectly entire hyaline margin, bright or at length deep green, *sparingly scurfy on the back*, otherwise quite glabrous; scurf-scales colourless, toothed or lacerated, 0.25 mm. in diameter, those

close to the margin projecting beyond it and imitating minute ciliolae. *Scape* somewhat wiry and quite glabrous. *Panicle lax*, up to 20 cm. long ; its branches all simple or the lowest branched again and up to 20 cm. long, supported by hyaline lanceolate-subulate bracts, 10 to 5 mm. long ; *secondary bracts* (at the base of the pedicels) ovate, acuminate, over 1·5 to less than 1 mm. long, thinly membranous, green ; *pedicels* up to 2 (rarely 3) mm. long, the lowest branches up to 25 mm. distant. *Sepals* equal, about 3·5 mm. long, overlapping (dextrorsely convolute) in the young bud only, green with white margins. *Petals* dextrorsely convolute in the bud, lanceolate-oblong when flattened out and 8–9 mm. by up to over 2 mm., milk-white to cream-coloured. *Stamens* 6, in two whorls ; filaments of the outer whorl free from the base, of the inner whorl fused below to the petals, all minutely and scantily papillose, 4 to 4·5 mm. long, soon curling up in the open flower, yellow. *Ovary* oblong-ellipsoid, deeply grooved between the carpels, 4 mm. long ; style slender, 5 mm. long ; stigmas very short with papillose tips. *Capsule* ellipsoid-oblong (when closed), 4 mm. long, septicidal to the base ; valves rather thin, 2-cleft to the middle. *Seed* oblong or slightly spindle-shaped, brown, 0·6 mm. long, with white membranous appendages and a narrow dorsal wing connecting them, the basal appendage 0·4 to 0·6 mm. long, the apical (in the continuation of the rhaphe) up to 1 mm. long.

DISTRIBUTION.—Peru, exact locality unknown. O.S.

Fig. 1, a whole plant, $\frac{1}{4}$ nat. size ; 2, part of an inflorescence, nat. size ; 3, a scape, nat. size ; 4, a leaf, nat. size ; 5, a flower, $\times 6$; 6, a petal, flattened out with stamen attached, $\times 6$; 7, stigmas, $\times 25$.



TAB. 9030.

KLEINIA STAPELIIFORMIS.

South Africa.

COMPOSITAE. Tribe SENECEONEAE.

KLEINIA, Mill. ; Senecio *subgen.* Kleinia, O. Hoffmann in *Engl. & Prantl, Nat. Pflanzenf.* IV. 5. 301 ; Senecio, Benth. & Hook, f., *Gen. Plant.* II. 446, *pro parte.*

Kleinia stapeliiformis. Stapf (*nov. comb.*) ; ab omnibus generis speciebus caule conspicue angulato foliisque in angulis superpositis rudimentariis subulatis distincta.

Syn. *Senecio stapeliiformis*, Phillips in Flow. Pl. South Africa I. t. 28 (1921).

Kleinias have had a place in botanic gardens and in the gardens of amateurs for a very long time. Dodonæus records “Anteuphorbium” (*Kleinia Anteuphorbium* ; Bot. Mag. t. 6099, a native of the west coast of Morocco) as grown by Jean Boisot at Brussels in 1570 ; Clusius had a sketch and a description of “Arbor Lavandulae folio” (*K. neriifolia* from the Canaries) from his friend and correspondent James Garet, a London apothecary, tulip grower and keen collector of *naturae curiositates*, who had the plant in cultivation in 1693 ; Dillenius figured three species of *Kleinia* in 1732, two (*K. neriifolia* and *K. papillaris*) from Sherard’s garden at Eltham in Kent, and the third (*K. Anteuphorbium*, a flower-head only) from a garden in Gloucestershire, adding that the first had not yet a proper name—he calls it *Cacalianthemum* – “although it is common and has been in cultivation for many years and in many gardens.” He also refers to a fourth species on the authority of Caspar Commelin of Amsterdam who had received it from the Cape (about 1702), this being our *K. ficoides*. Linnæus when at Clifffort’s garden at Hartekamp near Haarlem met with all four, and it was here that the name *Kleinia* originated (1737) in commemoration of the zoologist Jakob Theodor Klein who in 1718 had founded a botanic garden

in Danzig, and who in 1730 published a paper with a figure under the title “*An Tithymaloides frutescens foliis nerii. Plum. ?*”, meaning our *K. neriifolia*. Linnæus adhered to the name in his “*Hortus Cliffortianus*” (1747), but he replaced it by *Cacalia* in the first edition of the “*Species Plantarum*” (1753) and in its generic corollary, the fifth edition of the “*Genera Plantarum*” (1754), without any good reason and to the confusion of the so far perfectly unequivocal concept of the group. It may be that the violence with which Klein criticised the Linnean system had offended its author.

In this *Cacalia* the four species of *Kleinia* of the “*Hortus Cliffortianus*” still held the first place under the heading “*Frutescentes*,” but they were coupled with five other species (*Herbaceae*) which we refer now to no less than four distinct genera (*Porophyllum*, *Emilia*, *Cacalia*, *Adenostyles*), the last of the five being the basis of Linnæus’s earlier *Cacalia* (1737), namely our *Adenostyles alpina*, a member of the tribe *Eupatorieae*. This badly conceived genus was before long broken up into its natural constituents and *Kleinia* became once more a recognised genus (Haworth, 1812; Cassini, 1827; A. P. De Candolle, 1837; Endlicher, 1841; Lindley, 1847; Harvey, 1865). It was not until 1873 that *Kleinia* was connected with *Senecio*. This was done by Bentham in “*Genera Plantarum*” where he extended the concept of the genus so as to sweep, with one stroke, an enormous number of species—among them the *Kleinias*—into its compass. It is true he admitted the presence of natural subdivisions within *Senecio*, but he made no attempt to point them out. On the other hand he excluded *Emilia* and *Notonia*, groups which are as much connected with *Senecio* as *Kleinia*. O. Hoffmann in “*Natürliche Pflanzenfamilien*” also held to a very wide concept of *Senecio*, but he tried to do justice to the natural grouping of the species and divided the genus into four subgenera, *Emilia*, *Eusenecio*, *Kleinia* and *Notonia*, the bulk of the species going into *Eusenecio* with 23 sections in Eurasia and Africa alone. From a purely theoretical standpoint the genus could no doubt be still more extended with equal reason, but nothing would be gained thereby. The term would become meaningless, whilst the artificially submerged

groups would continue to assert themselves in the eye of the unprejudiced observer. It will therefore be better for all practical purposes to revert to the earlier conception of smaller genera within the vast congeries of forms which make up the *Senecio* of Bentham and of O. Hoffman. J. D. Hooker who paid some attention to the genus—he figured no less than six species in the Botanical Magazine—retained *Kleinia* as an independent genus and we consider it reasonable to do the same. After the name *Kleinia* had disappeared from the list of Linnæan genera, it was revived for two other genera of the same family, namely *Porophyllum* (1763) and *Jaumea* (1803), and these might be considered to have gained priority over *Kleinia*, but Mr. G. C. Druce has already pointed out that the publication of a formal description of *Kleinia* in the original sense of the first edition of Linnæus's "Genera Plantarum" ensures the validity of the name over the newcomers under the rules of the International Code, although Miller had by that time not yet adopted the use of binomials.

The genus *Kleinia* comprises, if, following J. D. Hooker and A. Berger we include *Notonia*, over 40 species ranging from the Canaries and the west coast of Morocco over all the drier parts of tropical Africa and of South Africa, Madagascar, tropical Arabia and certain areas of India as far as the Shan States, whilst excluding *Notonia* it does not extend beyond tropical Arabia. All the species are typical xerophytes of the "Cactus-form." Our species is particularly interesting on account of its angular stems with the rudimentary leaves disposed along the angles so that their spiral arrangement is completely obliterated, a condition unique in the genus. In the extreme reduction of the leaves it resembles *K. pendula* (Bot. Mag. t. 7659) with which it has also the relatively large fiery red flower-heads in common, but the articulation of the stem so marked in that species is here very imperfect.

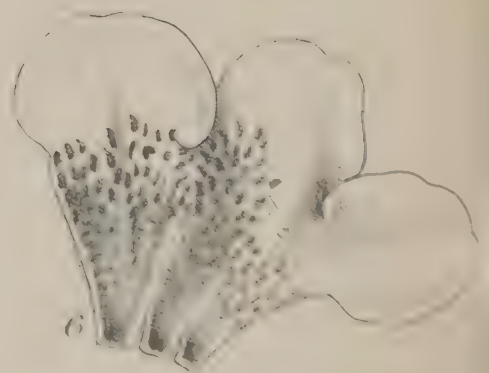
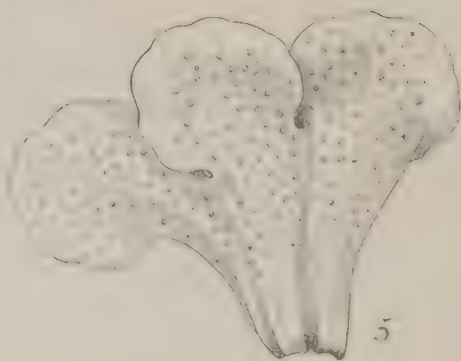
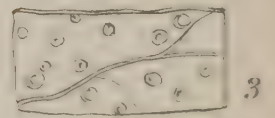
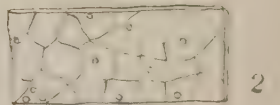
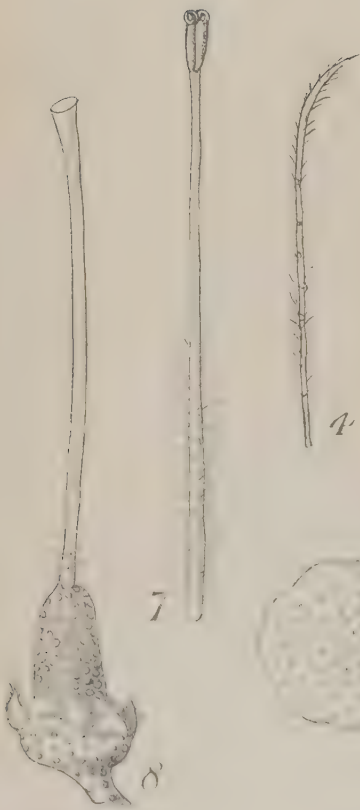
K. stapeliiformis was discovered by Mr. Carl Jeppe in the Lydenburg District in the Transvaal. Dr. J. Burt Davy also collected it at Fruizen near Potgieters Rust in the Waterberg District in 1906. He tells me that it grew in groups under acacia-bushes and that its brilliantly

coloured heads were very striking. Our plate was prepared partly from a specimen grown in the Royal Botanic Garden at Edinburgh (figs. 2-6) and partly from a plant in the collection of succulents at Kew (fig. 1), which had been received from Edinburgh, both plants being of the same origin, a consignment of May, 1922, from Dr. Pole Evans, Chief of the Division of Botany at Pretoria, to the Botanic Garden at Edinburgh. Treated as a greenhouse succulent under dry conditions it has flowered freely at Edinburgh in the early summer and it has been found readily propagable from cuttings.

DESCRIPTION.—A succulent of the habit, size and colour shown in the picture. *Stem* angular with 4 to 6 green lines descending from each of the leaf-bases, perfectly glabrous, *the angles varying from 4 to 6*. *Leaves* subulate, 4 to 5 mm. long, brownish, finally hardened and almost spine-like, superposed along the toothed angles of the stem and inserted on their teeth. *Flower-heads* as in the figure, solitary on more or less flexuous terminal peduncles, up to 15 cm. long and bearing some filiform rudimentary leaves, up to 5 mm. long; involucre of 10 to 13 leaves, 2.5 to 3.5 mm. wide, minutely hairy at the tips, somewhat fleshy except along the thin margins, flat or slightly concave on the back. *Flowers* up to 50, all alike, hermaphrodite, up to 3 cm. long. *Pappus* of more than 100 fine silky snow-white bristles, minutely barbed as seen under a lens. *Corolla-tube* 20 to 22 mm. long, reddish upwards, otherwise whitish; lobes thickened at the tips and slightly hooded, brilliantly minium-red. *Anthers* 3 mm. long exclusive of the appendages. *Achenes* cylindrical, smooth and glabrous at the time of flowering; styles 4 mm. long with shortly conical thickened stigmas.

DISTRIBUTION.—Transvaal; Waterberg and Lydenburg Districts, in the basin of the Olifant River. O.S.

Fig. 1, a barren stem, nat. size; 2, a flowering plant, $\frac{2}{3}$ nat. size; 3, a flower-head, nat. size; 4, a flower, $\times 2$; 5, stamens, $\times 6$; 6, upper part of a style, $\times 3$.



TAB. 9031.

RHODODENDRON BRACTEATUM.

West China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn. ; *Benth. & Hook. f., Gen. Plant.* II. 599 ; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron bracteatum, *Rehd. & Wils. in Sargent, Pl. Wils.* I. 519 (1913) ; cum *R. yanthino*, Bur. & Franch., comparatum, sed ab eo et aliis speciebus seriei *R. triflori* perulis interioribus vel foliis primariis ramulorum bracteiformibus linearibus diu persistentibus distinctum.—*Millais, Rhod.* 129 (1917) ; ed. II. 94, cum icon. (1924).

This is a very attractive shrub which in its home rises to 2 m. in height. Mr. J. C. Williams of Caerhays in Cornwall, however, to whom we are indebted for the communication of the material from which the present plate was prepared, informs me that his plants, compact bushes fourteen years old, are still only about 1 m. high. *R. bracteatum* does on the whole well in open land, but the hot sun of 1921 killed half of Mr. Williams's plants. It is easily recognised by the reduced condition of the lower leaves of the shoots which might be described as the inner scale-leaves or *perulae* of the vegetative buds, carried up and persisting on the lengthening shoot. They can by no means be called bracts as the name "*bracteatum*" suggests. Another peculiarity of the plant is the curious scent which the leaves emit, especially when crushed, and which recalls the odour of black-currant bushes. If we admit with Rehder & Wilson a close relationship between our plant and *R. yanthinum*, we shall have to place it in Balfour's "*triflorum* series" (see *Bot. Mag.* under *R. Searsiae* t. 8993). Mr. Millais, however, I see, refers it in the recent edition of his work to the "*heliolepis* series," represented among the species illustrated in the *Botanical Magazine* by *R. rubiginosum* (t. 7621). Space forbids to enter into this

question, quite apart from the fact that our knowledge of these series is still far too incomplete to attempt more than a tentative grouping with a very liberal margin for differences of opinion. *R. bracteatum* was discovered by E. H. Wilson at Wen-chuan-Hsien in Western Szechuan at 3,300 m. in July, 1908 (No. 3421), and collected again at somewhat lower altitudes at Mupin in 1910 (No. 4253). It was introduced by him to the Arnold Arboretum and distributed from there by Professor Sargent.

DESCRIPTION.—A shrub, 1–2 m. high, *sparsely scurfy in all its parts*, otherwise quite glabrous; scurf-scales disc-shaped, yellowish and shining. *Vegetative buds* globose-ovoid with brown, roundish apiculate and ciliate outer scales, the *inner scales being linear or lanceolate-linear and persisting—often several years—on the base of the full-grown shoots as slender brown cataphylls 6–15 mm. long with revolute margins.* *Leaves proper* crowded upwards on the branches, varying from oblong to ovate or elliptic with a rounded base and a small mucro at the blunt tip, 2–3.5 cm. by 1.2–1.8 cm.; thinly leathery, in the dry state with a fine network of impressed veins on the face, otherwise as shown in the plate; leaf-stalks 4–6 cm. long. *Flowers* in umbel-like clusters of 3 to 6, on slender stalks 1.2–2.5 cm. long, supported by early deciduous filiform hairy bracts, up to 8 mm. long. *Calyx* and *corolla* as shown in the picture, the former 1.2 mm. high, the latter 1 cm. by 1–1.2 cm., hairy within on the back of the throat. *Stamens* 10 with unequal filaments, hairy up to or almost up to the middle, the longest about 14 mm. long; anthers 1.5 mm. long. *Ovary* densely scurfy, up to 9 mm. long with a few minute hairs at the base. *Capsule* oblong, brown, 10–12 mm. long with narrow, obtuse valves. *Seeds* narrowly oblong, wingless, 2 mm. long.

DISTRIBUTION.—Western Szechuan in woodland and on cliffs, 2,600–3,300 m. O.S.

Fig. 1, a flowering branch, nat. size; 2, a part of the upper side of a leaf, $\times 5$; 3, a part of the lower side of a leaf, $\times 5$; 4, a bract, $\times 5$; 5, part of a corolla, seen from without, $\times 2$; 6, the same, seen from within, $\times 2$; 7, stamen, $\times 4$; 8, calyx and pistil, $\times 4$.



TAB. 9032.

KUNZEA AMBIGUA.

Australia.

MYRTACEAE. Tribe LEPTOSPERMEAE.

KUNZEA, Reichenb.; *Benth. & Hook. f., Gen. Plant.* I. 703; *Niedenzu in Engl. & Prantl, Nat. Pflanzenf.* III. 7. 94.

Kunzea ambigua, Druce in *Rep. Bot. Exch. Club Brit. Isl.*, 1916, 629 (1917); a finis *K. pedunculari*, F. v. Muell., a qua differt floribus maioribus subsessilibus, ramis aliis longis, aliis brevibus vel brevissimis ex illis ortis saepe numerosis. Syn. *Leptospermum ambiguum*, J. Smith in *Trans. Linn. Soc.* III. 264 (1797) et *Ex. Bot.* t. 59 (1805); *Lodd. Bot. Cab.* t. 1998 (1833). *Metrosideros corifolia*, Vent., *Jard. Malm.* t. 46 (1803); *DC. Prodr.* III. 225 (1828).

Kunzea corifolia, Schauer in *Lehm., Plant. Preiss.* I. 124 (1844); *Hook. f., Fl. Tasman.* I. 130 (1860); *Benth., Fl. Austral.* III. 115 (1866).

K. pelagia, F. Muell. in *Ned. Kruidk. Arch.* IV. 145 (1859).

Stenospermum corifolium, Sweet in *Hort. Brit.* ed. II. 209 (1830).

We are indebted for the contribution of the specimen figured here to Major A. A. Dorrien-Smith, who grows this delightful shrub to very good effect in his garden at Tresco Abbey in the Isles of Scilly, where it forms a bush about 3 m. high which is almost perpetually in flower, but in great profusion early in August and February. The plant has long had a place in English and French conservatories and winter-gardens where it was prized on account of the magnificent display of its myrtle-like flowers. It was first recorded from the collection of George Hibbert, a West India merchant and a patron of art and science, who grew it in his house at Clapham about 1796. It was from here that Dr. J. E. Smith described it in the same year as *Leptospermum ambiguum*. Nine years later he could already say of it that it was "not uncommon in our greenhouses." Meanwhile it had been introduced into France, no doubt from England. There E. P. Ventenat, unaware of Smith's description, described and figured it under a new name,

Metrosideros corifolia, from a plant in the garden of La Malmaison, the residence of Madame Bonaparte, the future Empress Josephine. For many years both names were in use concurrently until Schauer's combination *Kunzea corifolia* became familiar through Bentham's adoption of it in *Flora Australiensis*. Recently, however, under the international rules the original specific name "*ambigua*" was restored by Mr. G. C. Druce in the combination *K. ambigua*.

The genus *Kunzea* was based by the elder Reichenbach on several species which had been referred until then to *Metrosideros* (among them *M. corifolia*) and it was dedicated to the author's friend Professor Gustav Kunze of Leipzig, an authority on ferns. It comprises about 18 species, all natives of Australia, including Tasmania. They have much more in common with *Leptospermum* than with *Metrosideros*, and they differ from the former mainly in the stamens being much exserted from the flowers. Bentham distinguished two groups or sections among them, namely, *Eukunzea*, with few ovules in two rows and *Salisia* with numerous ovules on a peltate placenta. All the species referred by him to *Eukunzea* are West Australian except *K. Muelleri*, which, however, has peltate placentas with about 8 ovules on each placenta. It should therefore be placed in the second section. This is essentially East Australian, only *K. sericea* and *K. Baxteri* being species of the west. Of these *K. sericea* was considered by Lindley to represent a distinct genus (*Salisia*) whilst *K. Baxteri* is admittedly an aberrant type of doubtful affinity; it has in fact been described twice under *Callistemon* and once as a new genus (*Pentagonaster*). By the exclusion of these two species the two sections become morphologically homogeneous and geographically distinct groups. Our species belongs to the second section within which it approaches nearest to *K. peduncularis* from which it can be easily distinguished by the almost sessile flowers and fruits, those of *K. peduncularis* being borne on stalks which may grow out to almost 1 cm. in length.

K. ambigua is a plant of maritime cliffs, and its range extends from Stephens Port and Port Jackson in New South Wales to the Islands of Bass Strait and to Schouten

Island on the east coast of Tasmania. Capt. William Paterson of the New South Wales Corps, who arrived at Port Jackson in 1791,* and during his long stay at Botany Bay—he became eventually Lieutenant-Governor of that colony—collected many plants for Sir Joseph Banks, was no doubt instrumental in introducing our plant into England. Indeed, a specimen communicated by him to Banks may be seen in the Herbarium of the Natural History Museum, South Kensington. R. Brown also collected it at Port Jackson (*in saxosis ad littora*). He described it in the field very fully, but this description like many others written by his master hand remained unpublished. Our *Kunzea* also flourishes on the cliffs of the islands of Bass Strait and especially, according to Gunn, on the granite rocks of Flinders Island, where it is most abundant.

Major Dorrien-Smith raised his plants from seed received from New South Wales in 1906. He grows it in the open and it ought to do well out of doors in all the warm and sheltered parts of England and Ireland. Elsewhere it requires the protection of the conservatory or the greenhouse where it will be found easy of cultivation if it is treated like other Australian *Myrtaceae*, as for instance *Callistemon*, *Melaleuca*, *Metrosideros*, etc. Moreover, it is readily propagated from cuttings.

DESCRIPTION.—A *very much branched shrub*, in its home 2 to 4 m. high, *often with numerous short or very short lateral branches*; branches mostly more or less hairy. *Leaves* of the short-shoots crowded or fascicled, linear or oblanceolate-linear, pointed or slightly blunt, 5–10 mm. by 1–1.75 mm., leathery, gland-dotted like all parts of the plant, sparingly hairy or glabrous. *Flowers almost sessile, in loose or dense spikes* which are overtopped by the continuation of the leafy axis, solitary in the axils of leaves, with two small linear bractlets. *Receptacle and sepals* as in figs. 3 and 4, rarely more or less softly hairy, *the former 3 to 4 mm. long, the latter 2 to 2.5 mm. long, persistent. Petals 2 mm. in diameter,*

* This is the date of introduction given by Aiton, Hort. Kew., 2nd ed. III., 183 (1811).

white. *Stamens* indistinctly 2- to 3-seriate; filaments unequal, up to 4 mm. long; anthers yellow, 0.7 mm. long. *Pistil* as shown in figures 4, 5 and 7; style not or slightly exceeding the longest stamens; ovules numerous on a peltate placenta. *Fruit* a baccate capsule; the slightly enlarged receptacle tough and fleshy; the hardened crown splitting loculicidally so as to form 3 gaping pores. *Seeds* wedge-shaped in outline, 1 mm. long, brown.

DISTRIBUTION.—South-east Australia, on maritime cliffs from 33° S. southwards to Tasmania. O.S.

Fig. 1, a flowering branch, nat. size; 2, leaves in back- and face-view, $\times 3$; 3, a flower, $\times 5$; 4, a flower with the petals and stamens removed, $\times 5$; 5, a flower in section, with the petals removed and the stamens cut short, $\times 5$; 6, upper half of stamens, $\times 12$; 7, cross-section through receptacle and ovary, $\times 8$.





TAB. 9033.

BULBOPHYLLUM MORPHOLOGORUM.

Siam.

ORCHIDACEAE. Tribo EPIDENDREAE.

BULBOPHYLLUM, *Thou. ; Benth. & Hook. f., Gen. Plant.* III. 501 ; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 178 (*Bulbophyllum*).

Bulbophyllum morphologorum, *Kränzlin in Orchis* II. 89, 90 cum fig. (May 1908) ; a *B. sicyobulbo*, Reichb. f., cui arete accedit, pedunculo longo, floribus maioribus olivaceis rubro-pictis, labelli auriculis brevissimis distinctum ; etiam cum *B. crassipede*, Hook. f. (vide *Bot. Mag. t.* 4166 sub *B. Careyano*), comparandum sed pseudobulbis ovoideis, pedunculo longo, spica elongata, sepalis lateralibus longioribus, labelli auriculorum forma differt.—Hosseus, *Beih. Bot. Central Blatt.* XXVIII. 380 (1911).

Syn. *Bulbophyllum Dixonii*, Rolfe in *Kew Bull.* 1908, 412 (Nov. 1908).

This quaintly named orchid was discovered by Dr. C. C. Hosseus on Doi Sootep (1,675 m.), a mountain west of Chiangmai (307 m.), North-west Siam, in 1904–05. It formed part of a considerable collection of orchids from the locality mentioned, which came into the possession of Baron Max von Fürstenberg of Hugenpoet, Kettwig, Rhine Province, where it flowered in 1908. It was described by Professor F. Kränzlin in May of the same year. Soon after Hosseus's discovery of the plant Dr. A. E. G. Kerr who had meanwhile taken up a medical appointment at Chiangmai collected the plant in the same district. He sent specimens of it to Professor H. H. Dixon of Trinity College, Dublin, and when they flowered in 1908 a piece was communicated to Kew where it was described by the late Mr. R. A. Rolfe as *Bulbophyllum Dixonii* in the *Kew Bulletin* for that year ; but as the number containing the description did not appear until November Kränzlin's name retained priority.

The altitude at which Hosseus and Kerr collected our plant and the special conditions under which it was found growing are unknown ; probably it is one of the numerous epiphytic orchids of the grassy jungle of the higher slopes of the mountain.* The climate of Chiangmai with

* See *Kew Bulletin* 1911, pp. 3–6.

its high monthly maxima (34° C. to 44° C. in the shade) and its low monthly minima (8° C. to 20.5° C.), and with its long dry period (December to February with practically no rainfall) implies a severe test on the vegetation and consequently suggests a robust constitution of the plants which are adapted to it. They should therefore not be difficult to grow if due allowance is made for their need of a prolonged rest during the winter and of a sufficiently high temperature and of moisture in the late spring and the summer. At Kew *B. morphologorum* has flowered, so far, early in February which corresponds to the end of the cold dry season of its native country. The particular plant figured here was received at Kew from Glasnevin in 1922, and Mr. Besant, the Acting Curator of the Glasnevin Gardens, informs me that his establishment acquired it from Charlesworth's in 1914; its earlier history is, however, unknown.

The name *B. morphologorum*, so its author says, was chosen because the species was supposed to be of particular interest to morphologists owing to the presence of a small lobule between the posticus and either of the lateral sepals, a peculiarity which leads him on to discuss the morphological nature not only of the lobule but also of the receptacle or "inferior ovary" of Orchidaceae generally, which he considers as made up of three carpels. These lobules occur in various species of *Bulbophyllum*, some of them closely, others remotely related. They have early attracted the attention of morphologists and they have played some part in the attempts to interpret the orchid-flower. In our species they are so small as to be easily overlooked, and they have escaped the eye of the artist when preparing the plate. They have to be looked for outside and just below the petals, the bulging base of which conceals them in fig. 2 of the plate. They are in our case, and probably generally, contact-protuberances of the rim of the receptacle, fitted into the interstices between the primordia of the sepals, and early arrested. The contact-effect of their interpolation on the sepals is seen in the sharp angles which the bases of the sepals form where in the course of their development they become free from the contact with the lobule. These angles are well shown in fig. 3. As to the nature of the "inferior ovary" of the orchids, and the

same applies to "inferior ovaries" in general, its development as well as the disposition of the parts of the flower leaves no doubt that it represents a case of axial invagination with the sepals and petals (if any) on the rim of the cavity and with the carpels and placentas rising from inside it, whilst the ideal apex of the axis is at the bottom of the cavity. Hence the substitution in these pages of the term "inferior ovary" by that of "receptacle."

B. morphologorum belongs to a group of species which is known as the *Careyana*-series or section, so named after *B. Careyana*, Spreng. (1826), the first of them that was described. They extend from the Malay Peninsula through the Burmese mountain-ranges to Khasia and Sikkim and also include two species of the Nilgherries. Whether and how far they are represented in the Malay Archipelago is still uncertain.

DESCRIPTION.—The picture given here may be taken as representative of the species as far as it is known, so that little is to be added by way of description. The principal distinctive characters are in the *four-angled egg-shaped pseudobulbs, the long peduncle, the elongated moderately dense raceme, the colour of the flowers, the rather long sepals which cohere so as to form an oblong acutely beaked boat like structure up to 5 mm. long and the very blunt small auricles at the base of the lip.* It may be observed that the pseudobulbs which spring from a creeping rhizome in loose arrangement become much more distinctly four-angled as they grow older and that the racemes, according to Kränzlin, may attain to a length of 25 cm. The bracts are ovate-lanceolate, 3 to 6 mm. long, membranous and 1-nerved. The lip is rather fleshy and firm and of a bright rich yellow with dark purple markings on the face.

DISTRIBUTION.—N.W. Siam ; Doi Sootep near Chieng-mai (only locality known, see above). O.S.

Fig. 1, part of a plant, nat. size ; 2, a flower in side-view, $\times 5$; 3, the same in front-view with the sepals and petals flattened out, $\times 5$; 4, gynostemium and lip in side-view, $\times 7$; 5, column and empty anther in front-view, $\times 7$.



TAB. 9034.

COLEUS PUMILUS.

Philippines and Borneo.

LABIATAE. Tribe OCIMOIDEAE.

COLEUS, Lour.; Benth. & Hook. f., Gen. Plant. II. 1176; Briquet in Engl. & Prantl, Nat. Pflanzenf. IV. 3a, 359.

Coleus pumilus, Blanco, Fl. Filip. 482 (1837); 2nd ed. 336 (1845); ed. Naves II. 257 (1878); inter species sectionis *Solenostemonoidis* cum *C. Boieri*, Benth., et cum *C. acuminato*, Benth., comparatus est, sed habitu, foliis parvis orbiculari-ovatis vel late deltoideis eximie purpureo-maculatis, panicula laxa distinctissima. —Benth. in DC. Prodr. XII. 78.

Syn. *Coleus Gaudichaudii*, Briquet in Ann. Conserv. Jard. Bot. Genev. II. 237 (1898).

C. Rehneltianus, A. Berger in Engl. Bot. Jahrb. liv. Beibl. 120, 197 (1917).

About ten years ago Herr F. Rehnelt, Curator of the Botanic Garden at Giessen, Hesse, found in the neighbourhood of Anuradhapura, the ruined ancient capital of Ceylon, a small coleus, which attracted his attention by the beauty of its variegated leaves. Three years later Herr A. Berger described it as *C. Rehneltianus*, and the firm of Haage & Schmidt of Erfurt distributed it under that name. The facts that it had not been observed before in Ceylon and that there had been at Anuradhapura a branch-garden of the Botanic Garden at Peradenyia suggested casual introduction from some place outside the island. This turned out to be the case when specimens grown at Kew from seed obtained from Haage and Schmidt were compared with the *Coleus*-material in the Herbarium, for they proved to be specifically identical with a plant collected in the Philippines by Vidal, Loher and Merrill* and at Bau in Sarawak by Mr. W. H. Smith. Vidal's and Loher's specimens and one of Merrill's came from Manila and neighbourhood, the

* Vidal, no. 3486; Loher, no. 4229, a. 1890; no. 4230, a. 1892 and no. 5038; Merrill, no. 455, a. 1902; no. 3940, a. 1905 and no. 4317, a. 1905.

latter with the note "cultivated only." Other specimens, however, from the Bued River in the province of Benguet in northern Luzon* and from "damp thickets" in the small island of Culion† (between Mindoro and Palawan) represent evidently the wild state and the same applies to the specimen from Sarawak, as Mr. Smith expressly remarks. A suggestive manuscript note by Mr. Skan in the Kew Herbarium leads us back much farther. It is to the effect that the specimens mentioned belong probably to the long lost and obscure *C. pumilus* of Blanco. In my opinion there can be no doubt that this is the case. Manuel Blanco, an Augustine monk who resided long in the Philippines—he died there in 1845—and to whom we owe a most valuable flora of the islands (first edition 1837), not only gave a very full description of the plant which agrees with the subject of our plate, but he also added some remarks which apply well to it. He observed it, so he says, at Limbones (province of Batangas?) and it was common at Pasig, 12 km. east of Manila, growing frequently on the tiled roofs of the village, whilst in the city of Manila it was grown in pots on account of the quaintly blotched leaves. But Blanco was not the only botanist who recorded it in those days. When late in 1837 Charles Gaudichaud, the French botanist, who accompanied the "Bonite" on her cruise round the world, visited Manila he too collected the plant there; however, like many of his discoveries, it remained unnoticed until 1898, when Dr. Briquet redescribed it as *C. Gaudichaudii* from a specimen in the Delessertian Herbarium at Geneva. This name and Berger's have become now synonyms of Blanco's *C. pumilus*, which is incidentally a more descriptive designation. Mr. Ridley tells me that he believes to have seen it also in gardens at Singapore. How it came there and how it reached Ceylon we cannot say at present. There are also other species of *Coleus* which have been in cultivation in the Malay Archipelago from immemorial times either for medicinal purposes or for their scent or their ornamental foliage, and some of these have found their way at an early date into other countries.

* Merrill, no. 4317,

† Merrill, no. 455.

The affinity of the plant lies, as Berger has suggested, rather with *C. Boieri*, a species of Madagascar, than with the Philippine *C. acuminatus*, as Briquet would have it, whilst *C. Benthamianus* and *C. inflatus*, near which Bentham placed it, are evidently out of the question.

C. pumilus can easily be raised from seed which takes 4 to 6 weeks to germinate or from cuttings, the latter rooting freely at an intermediate temperature. It is very suitable for basket-culture in an ordinary greenhouse or conservatory and in the south at least it may be planted out in the summer for edgings for small beds or for carpet-bedding. Last winter there were several baskets in flower at Kew and they were most ornamental with their display of beautifully coloured leaves and the multitude of erect inflorescences of almost sky-blue flowers. The material for our plate was taken from one of them.

DESCRIPTION.—A perennial herb with numerous creeping, prostrate or ascending stems, frequently rooting from the nodes, more or less four-angled and minutely downy, the whole plant 15 to over 30 cm. high. Leaves borne on slender sparingly hairy stalks up to 2 cm. long: their blades ovate-orbicular to broadly ovate-deltoid with mostly five coarse obtuse, rarely acute, teeth on each side, 1.5 to 2 cm. long and about as wide (on lateral shoots often very much smaller), with some white hairs on the face, otherwise almost glabrous, bright green with a very large purple blotch in the centre, paler on the back with smaller patches of purple. Panicle oblong, 5 to 15 cm. by up to 5 cm. or more, often of very numerous opposite or whorled loose cymes, all the axes minutely glandular and downy; flower-stalks very fine, ultimately up to 4 mm. long. Calyx very small in the flower, from not much over 1 to 2 mm. long, much enlarged in the fruit (up to over 4 mm.) and scarious with prominent nerves and veins, glandular and sparingly downy, otherwise as shown in figs. 2, 3 and 9. Corolla about 1.5 cm. long, bright blue or the tube paler and bluish-mauve, very minutely hairy and sparingly glandular, of the shape shown in figs. 1 and 4; the upper lip (fig. 6) pale blue along the margins, otherwise

cream-coloured or white; the lower lip often slightly keeled. *Stamens* united into a tube up to beyond the middle, enclosed in the lower lip; anthers as in figs. 7 and 8. *Disc* produced into an oblong gland (fig. 3). *Style* shortly exserted from the lower lip with a minute bifid stigma. *Nutlets* globose, 0.75 mm. in diameter, brown or almost black; testa very minutely glandular.

DISTRIBUTION.—Central and North Luzon and neighbouring islands. North Borneo; Sarawak.

O.S.

Fig. 1, flowering branches, nat. size; 2, calyx and base of corolla, $\times 10$; 3, calyx in top-view with disc-gland and nutlets in the centre, $\times 10$; 4, corolla in side-view, $\times 4$; 5, the same with lower lip and base removed to show stamens and style, $\times 6$; 6, upper lip of corolla, $\times 4$; 7 and 8, anthers in back- and oblique front-view, $\times 30$; 9, fruiting calyx, $\times 6$.

TAB. 9035.

RHODODENDRON GLISCHRUM.

South-west China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn. ; *Benth. & Hook. f., Gen. Plant.* II. 509 ; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron glischrum, Balf. f. & W. W. Smith in *Not. Bot. Gard. Edinb.* IX. 229 (1916) ; arcte affine *R. habrotrichum*, Balf. f. & W. W. Smith, sed foliorum laminis lanceolatis longiuscule acuminatis multe longioribus (saepe ultra 20 cm. longis) tenuius ciliatis distinctum.—Millais, *Rhododendron* 173 (1917) ; 2nd ed. 148 (1924).

Rhododendron glischrum and *R. habrotrichum* might be looked upon as twin-species which originated by the splitting of a very marked ancestral form on leaf-lines, the main points involved being the shape and size of the leaves, these being long and narrow (ratio of length and width of the blade about 4:1) and finely acuminate in the former, elliptic-oblong (ratio 2:1) and shortly acute to blunt in the latter. The marked character representing the common heritage of both would then be in the abundant occurrence of peculiar gland-tipped bristles or hairs on all the axes, the leaf-stalk and the base of the mid-rib, the sepals and the pistil, the glands exuding sufficient viscid matter to render the plant sticky. Similar gland-tipped bristles are found in *R. diphrocalyx*. This, however, is suspected to be a natural hybrid with *R. habrotrichum* as one of its parents. Professor Balfour has suggested affinity with *R. strigillosum* (Bot. Mag. t. 8864) for *R. glischrum* and with *R. Smithii* (Bot. Mag. t. 5120) for *R. habrotrichum*. In my opinion it lies for both with *R. strigillosum*, *R. pachytrichum* and *R. monosematum* (Bot. Mag. t. 8675), all species of Szechuan. *R. Smithii*, a native of Bhutan, is a more aberrant type leading us to the wider group of the *barbatum*-series, which ranges westwards as far as Kumaon. *R. glischrum* was

discovered by G. Forrest "in open situations in thickets and forests" on the Kari Pass in the watershed of the Yangtse and the Mekong in $27^{\circ} 40' N.$ in July, 1914 (No. 12901), and it was collected there again by him in October of the same year (No. 13564). More recently he also met with it farther north on the Doker-La ($28^{\circ} 25' N.$) in the Mekong-Salween divide at about 3,300 m. (No. 16555). Mr. Forrest speaks very highly, so Mr. Millais says, of the masses he saw of this rhododendron, the colours of whose flowers he describes as a lovely pink.

The accompanying plate was prepared from a specimen communicated by Mr. J. C. Williams of Caerhays Castle, Cornwall, early in June, 1923. Another sample received in May, 1922, from Mr. G. W. E. Loder, Wakehurst Place, Ardingly, Sussex, had paler, almost lilac flowers. The species has proved so far perfectly hardy in both places and it is a fairly quick grower. The chief interest lies perhaps in the peculiar hair-covering of the plant which is fully discussed in the "description." There also will be found an account of the structure of the terminal buds which were a prominent feature in another branch received from Mr. Williams as these lines went to press. They represent the winter-condition.

DESCRIPTION.—A shrub or small tree, up to 8 m. high, with three kinds of trichomes, namely (1) bristles of varying length (2 to 4.5 mm.) with viscid rose-coloured to blackish glands at their tips, particularly conspicuous on the current year's shoots, on the leaf-stalks and the base of the mid-rib of the leaves; (2) soft bristles or simple hairs without glands; (3) very finely branched hairs of the type shown in fig. 8 which form a fine scanty fluff among the coarser trichomes and mostly disappear soon. *Terminal (fertile) buds* ovoid, their outer scales leafy, long-caudate-subulate from a short ovate base, curved, up to 25 mm. long, bristly-glandular, the inner gradually shorter, subulate acuminate. *Foliage-buds* ovoid, 1 to 1.5 cm. long, outer scales green, viscous, at length dry, chestnut-brown, long persistent, inner scales (of the sprouting shoot) elliptic-oblong, apiculate, subherbaceous, slightly silky, up to 2 cm. long. *Leaf-blades*

narrowly oblong-lanceolate from a more or less rounded base, narrowly acuminate, up to 20 cm. by 4 to 6 cm., hardly leathery, when full grown, glabrous on the face, finely hirsute and partly glandular on the back along the stout mid-rib and the nerves (about 15 on each side) and finely ciliate along the margins; leaf-stalk very stout, 2 to 2.5 cm. long. *Flowers* (10 to 15 or more) in umbel-like terminal racemes; bracts obovate-oblong, suddenly acuminate, up to 5 cm. long, densely silky without; flower-stalks up to 4 cm. long, densely fulvously villous and glandular. *Calyx* as shown in figs. 1 and 6; segments herbaceous, up to 1.5 cm. long, more or less villous and glandular. *Corolla* as in the picture, varying from pale lilac to mauvy pink, 3 to 4 cm. long, quite glabrous. *Stamens* as in figs. 1 and 5, the filaments glandular below the middle. *Ovary* and *style* densely covered with soft white gland-bearing bristles. *Capsule* oblong, 1.5 cm. by 4.5 mm., viscous, surrounded by the persistent calyx. *Seeds* flat, oblong, up to 2 mm. long, crested at both ends.

DISTRIBUTION.—North-west Yunnan; in the mountains of the watersheds of the Yangtse, Mekong and Salween, from 27° 40' E. to 28° 25' N. at about 3,000 to 3,300 m. O.S.

Fig. 1, a flowering branch, nat. size; 2, a leaf-base (upper side), nat. size; 3, a bract, nat. size; 4, a bractlet, $\times 2.5$; 5, a stamen, $\times 3$; 6, a calyx with flower-stalk and style, nat. size; 7, a pistil with the base of the calyx, $\times 5$; 8, a hair from the fluff at the base of the style, $\times 100$.



PRIMULA MELANOPS.

South-west China.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA, Linn. ; *Benth. & Hook. f., Gen. Plant.* II. 631 ; *Pax in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 104 et in *Engl. Pflanzenreich* IV. 237. 17.

Primula melanops, W. W. Smith & Ward in *Not. Bot. Gard. Edinb.* XIV. 48 (1923), arete affinis *P. sinopurpurea*, Balf. f. (*Bot. Mag.* t. 8777), sed minor, foliis angustioribus in dorso albedo-farinosus, floribus saturate violaceis oculo nigro tubo angustiore diversa.

Syn. (?) *P. sinoplantaginea*, Balf. f. in *Journ. R. Hort. Soc.* XXXIX. 160 (1913) et in *Not. Bot. Gard. Edinb.* XIII. 20 (1920).

In 1772 a Russian student, Nicholas Sokoloff, during an expedition along the Russo-Chinese frontier, discovered a *Primula* which Pallas, who published Sokoloff's most interesting account of the journey, called *P. nivalis* as it was found growing by the edges of the snowfields of Mt. Shokondo (2,450 m.) in the Yablonovi range. Pallas thought that the species was confined to the Transbaicalian Alps. In this he was mistaken as it was subsequently collected in the Altai, the Sayan mountains and the Tanna Olu in North-eastern Mongolia. There is no doubt as to the specific identity of the specimens obtained from this area which may be described as the northern fringe of Central Asia. Soon, however, similar primulas discovered in the high mountains of Turkestan, in the Thianshan and in the arctic coastlands and islands of the Behring Sea were either identified with Pallas's plant or considered as "varieties" of it. When later, in 1873, Regel attempted a synoptical account of the primulas of the Russian Empire, he tabulated *Primula nivalis* as a species ranging from the Caucasus to the Behring Sea and as composed of not less than seven varieties. One of these varieties was based on a Garhwal plant. This was the first instance of an extension of the

concept of *P. nivalis* to allied Himalayan types which had so far been grouped under Wallich's *P. Stuartii* (1824) or Royle's *P. purpurea* (1836). J. D. Hooker when dealing with *Primula* in the Flora of British India (1882) "felt unable to draw any specific characters between the many forms" (of this group) and he boldly included them in a widely conceived *P. Stuartii*, adding "If there are species amongst them they hybridise so as to defy recognition by description." Seven years later followed Pax's revision of *Primula* in Engler's Jahrbücher. Hooker's *P. Stuartii* was now broken up into a *P. Stuartii*, corresponding to Wallich's original idea, and a number of "varieties" which found a place in a much extended *P. nivalis*. Pax adhered to this view in his monograph in the Pflanzenreich (1906) admitting in all 10 varieties, one of them based on the *P. Stuartii* of Franchet from Yunnan and on a plant collected by Pratt in Szechuan. Thus matters stood when the late Professor I. Bailey Balfour began to apply his discriminative acumen to the Chinese species of *Primula*. Admirably prepared and well annotated collections by Forrest were by this time at hand and they threw fresh light on the problem of the group. New forms whose claim to specific rank could hardly be gainsaid were added, others were reinstated in their status as species and others again relegated to another "series," the "*sikkimenses*." In a preliminary study Balfour (1914) listed 19 species (excluding the Himalayan forms) grouped in a "*nivalis* series." Of these 7 were Chinese, and 5 American (2 included only doubtfully, and 2 Alaskan), the rest ranging from the Black Sea through Central Asia to the Behring Sea. Since then the influx of primulas from China has continued and the number of Chinese forms of "*nivales*" admitted by the Edinburgh botanists either as species or as "microforms" has risen from 7 to 30. Most of them are natives of the north-western corner of Yunnan and the immediately adjoining parts of Szechuan, an area considerably smaller than that of Switzerland, whilst the main area of Pax's *P. nivalis* equals roughly that of Europe minus Russia. The difficulties which confronted Hooker when he was dealing with the Himalayan section of the *nivales* arise naturally also among their Chinese allies, but experience has taught

us to discriminate more sharply, and practical considerations have compelled us to recognize more definitely the result of that discrimination, just as a later mapper will see and render the features of a country differently from the sketch which a pioneer-surveyor has drawn.

P. melanops was discovered by Capt. F. Kingdon Ward in the Litang-Sholo watershed (about 100° 40' E.) in South-west Szechuan, where it grows in the screes of glacier-lakes and on the highest slopes of the mountains above Muli (28° 10' N.) at altitudes between 4,200 and 4,500 m. (Nos. 4080 and 5132). I have compared it in the Latin diagnosis with *P. sinopurpurea* and added *P. sinoplantaginea* as a doubtful synonym. Both occupy practically the same area, an area which incidentally includes that of *P. melanops*. Both vary very much and on similar lines with regard to stature, "mealiness," colour of the flowers and size of flower-parts, and they vary so that partial overlapping occurs. Nevertheless *P. sinopurpurea* seems to have generally broader leaves and on the average moderately larger corollas with somewhat plumper tubes. This imparts to it a facies slightly distinct from that of *P. sinoplantaginea*. Without experiment it is, of course, practically impossible to say whether the discriminative characters are really stable. They may indicate the presence of fixed genetic units or merely of slight mutations among otherwise homogeneous populations. In either case we may treat them provisionally as distinct entities with distinctive binominals. It is otherwise with *P. melanops*. Such specimens as I have seen come so near to some specimens recognized as *P. sinoplantaginea*, that I cannot but suspect specific identity.

The plant figured here was one of several raised at Kew from seed received from Capt. Ward (4080) in 1922 and grown in moist rich soil in a shady position. They flowered in May of this year (1924). Some of the plants have died since, but the specimen drawn here which was potted afterwards and kept in a frame looks strong and healthy at the time of writing (November) and it has produced several tufts of leaves from the collar. Although primulas of the *nivalis*-series have been known for so long a time they have never been able to establish themselves firmly in our

gardens, evidently because there is some inherent difficulty in their cultivation. This difficulty will be appreciated if we consider that all the more showy forms are plants of high altitudes growing by the edge of snowfields and glaciers or in the more or less peaty soil fed by the cold streamlets of snow-water-fed slopes, and that they have naturally a very long resting period. To reproduce these conditions or their equivalent will always be so difficult as to exclude them from ordinary gardens, but it should not be impossible to give them what their constitution requires with the means which the public gardens and the specialist have or should have nowadays available for the purpose. Sunk pits with appropriate adaptations on the principle of cold storage ought to go a long way to meet the case.

DESCRIPTION.—The following may be added in supplementation of the plate. *Leaves* varying in width from 1.2–2 cm., if fully flattened out, but the margins often considerably revolute towards the end of the season, when the leaves appear linear-lanceolate with a width of hardly over 1 cm.; “meal” of the underside of the blades often slightly yellowish, that of the inflorescences rather of a pure white. *Bracts* at the base of the inflorescence subulate-lanceolate from a broad ovate base, often connate at the base, their colour that of the calyx and varying to a deep purplish-black; pedicels 5–10 mm. long. *Calyx* 7–9 mm. long, cleft to slightly beyond the middle, segments with mealy margins. *Corolla* deep violet to Tyrian purple with a black eye; tube 10–14 mm. by 2.5 mm. in the narrow section of the tube, by 4–4.5 mm. in the widened part; limb 1.8–2.25 cm. across; lobes 8–10 mm. by 5.5–8 mm. *Capsule* cylindric, up to over 2 cm. long.

DISTRIBUTION.—South-west Szechuan, mountains to the West of Muli (Litang-Sholo watershed), 4,200–4,500 m.

Fig. 1, a whole plant, nat. size; 2, a pin-eyed flower, nat. size; 3, longitudinal section of the tube of a pin-eyed flower, $\times 2$; 4, a thrum-eyed flower, nat. size; 5, the limb of a thrum-eyed flower, nat. size; 6, longitudinal section of a thrum-eyed flower, $\times 2$.



TAB. 9037.

CLEMATIS NAPAULENSIS.

North India and South-west China.

RANUNCULACEAE. Tribe ANEMONEAE.

CLEMATIS, Linn.; *Benth. & Hook. f., Gen. Plant.* I. 3; *Prantl in Engl. & Prantl, Nat. Pflanzenf.* III. 2. 62.

Clematis napaulensis, DC. *Syst.* I. 164 (1821) et *Prodr.* I. 9 (1824); affinis *C. cirrosae*, Linn. (Bot. Mag. t. 1070), sed perulis vix ullis, foliolis normaliter maioribus et pro rata multo angustioribus, florum indole, i.e. sepalis vix petaloideis neque demum patentibus ampliatisque filamentis purpureis superatis plane distincta.—Madden in *Bengal Journ. Asiat. Soc.* XVI. 596 (1847) et XVIII. 608 (1849) (*nepalensis*); Hook. & Thoms., *Fl. Ind.* I. 6 (1855) (*nipalensis*) et in Hook. f., *Fl. Brit. Ind.* I. 2 (1875).

Syn. *C. montana*, D. Don, *Prodr. Fl. Nepal.* 192 (1825), non aliorum.

C. cirrosa α . *nepalensis* et β . *heterophylla*, O. Kuntze in *Verhandl. Bot. Ver. Prov. Brandenburg* XXVI. 143 (1885).

C. Forrestii, W. W. Smith in *Not. Bot. Gard. Edinb.* VII. 183 (1914).

The discovery of this *Clematis* on the western flank of the Shweli-Salwin watershed (25° 20' E.) marks an interesting extension of a type not recorded so far from China. It was made by G. Forrest in December 1912 when he found it growing there in open situations, climbing in trees and shrubs to a height of 6 to 10 m. at an altitude of 2,100 to 2,400 m. (no. 398). He collected it again in the same locality in February of the following year (no. 9526), and it was from this collecting that the plant was introduced through Mr. J. C. Williams of Caerhays Castle, Cornwall, into the Botanic Garden of Edinburgh whence the material came that served for the preparation of the present plate. So far the plant was only known from its wide range in the outer Himalaya where it had first been collected more than one hundred years ago. It was among the early contributions which A. B. Lambert received out of the rich gatherings of Wallich's collectors. Wallich did not localise it beyond the general statement "Napaulia," which in this case probably means the neighbourhood of Kathmandu.

Griffith found it afterwards in Bhutan, but here again we are reduced to this very bald statement— " Bhutan." J. D. Hooker came across it late in 1848 in eastern Nepal just beyond the Sikkim frontier, in the valley of the Pemmi river, whilst the year before it had been recorded by Madden from Kumaon where it is said to be common on the southern slopes of the mountains (up to 2,000 m.) above the lake of Naini Tal, growing always in or by running water and flowering in December and January. Madden also states that it occurs likewise in the upper reaches of the Nayar river in British Garhwal (about 79° E. by 30° N.). O. Kuntze in his monograph of *Clematis* has treated our species as a variety of the Mediterranean *C. cirrosa*. Whilst the affinity of the two plants cannot be gainsaid, few botanists will go so far as O. Kuntze in stretching the species-concept. Nor is there any evidence in support of his theory of an immigration of the Himalayan plant into the Mediterranean countries and of a subsequent adaptation to Mediterranean conditions resulting in the modification represented by *C. cirrosa*. Instances of similarly vicarious species occur throughout the floras of the two regions, and they are evidently the result of the effect of different evolution of physical conditions on an earlier much more homogeneous common flora which stretched from North Africa and South Europe to the slopes of the Himalaya and even beyond it into China.

Like many species of *Clematis*, *C. napaulensis* exhibits a wide range of fluctuation in the shape, division and size of its leaves which have nevertheless throughout a common and distinct facies (see the description below). The plant is apparently in foliage all the year round, which may account for the imperfect protection of the buds from which the spurs arise, these having only two or three scales at the base, modified leaves whose slightly widened bases become hardened whilst their rudimentary blades wither off early. The Mediterranean *C. cirrosa* on the other hand has to satisfy the severer demands of a drier climate, and bud-protection is secured by more numerous and more typical bud-scales.

C. napaulensis is grown in Edinburgh in the cool house where it grows freely and flowers profusely during

the winter, fruiting well in the spring. It is doubtful whether it will prove hardy out of doors in England except in the warmest parts; but the ease with which it can be grown in the conservatory either from seed or from internodal cuttings made in July or August recommends it as an addition to our winter-flowering indoor-shrubs, welcome on account of its rich foliage and its quaint flowers in which the creamy or greenish-white of its silky sepals combines with the purple of the numerous exerted stamens and the green skeins of the even more exerted styles in an unusual colour-pattern.

DESCRIPTION.—A *shrub* climbing to 3–10 m. by means of tendrils, the modified stalks of the leaves of long-shoots (the bases only are shown in the plate), all but glabrous excepting the flowers; outer bark chestnut-brown, soon peeling off exposing the pale cinnamon-coloured and grooved inner bark. *Spurs imperfectly perulate at the base.* Leaves of long-shoots distant, mostly 5-foliolate with the two pairs of leaflets widely distant, those of the spurs crowded in axillary tufts of up to 10, 3-foliolate; leaf-stalks and rhachis slender, together up to over 10 cm. long in the leaves of the long-shoots, much shorter in the spur-leaves; *leaflets ovate-lanceolate or linear-lanceolate, more or less acute, entire or coarsely and sparingly toothed or, in the leaves of the long-shoots, 3-lobed to 3-fid, the toothing or lobing increasingly more marked from the terminal leaflet downward, the terminal leaflets and segments longer than the lateral, up to 8 cm. by 3 cm.* (but often considerably smaller), *thinly papery*, lateral leaflets of the spur-leaves sessile or shortly stalked; stalks of the terminal and the lower lateral leaflets of the long-shoots generally much elongated (up to 4 cm.). *Flowers* solitary from the leaf- or tendril-axils of the spurs, pendulous, *narrowly-campanulate, much overtopped by the leaves*; pedicels with 2 prophylls, united into a 2-lobed finely tomentose cup, 6 to 8 mm. long, which in the young bud embraces the base of the bud, but recedes, as the flower opens, by the elongation of the upper tomentose internode of the pedicels, which finally measure from 2 to 4.5 cm. in length. *Sepals hardly petaloid, slightly spreading,*

otherwise as shown in the plate, 1.5 to 2 cm. by 4 to 5 mm., creamy or greenish-white, silky. *Stamens* purple, *exserted filaments* 2 to 2.5 cm. long; anthers laterally dehiscent, 2 to 2.5 mm. long. *Carpels* numerous from a finely hairy globose torus. *Achenes* elliptic-orbicular in outline, 5 to 6 mm. by 4 to 4.5 mm., compressed with a thickened whitish margin, minutely hairy; awn (persistent style) plumose from the base.

DISTRIBUTION.—Outer Himalaya from Garhwal to Bhutan and South-west Yunnan, from 1,800 to 2,400 m.
O.S.

Fig. 1, a part of a flowering branch, nat. size; 2, a stamen, $\times 3$; 3, an anther, $\times 7$; 4, a pedicel with the bare torus of a flower, nat. size; 5, a ripe fruit, nat. size; 6, the same without the "awn," $\times 2$.



TAB. 9038.

MONTBRETIA LAXIFLORA.

South Africa.

IRIDACEAE. Tribe Ixieae.

MONTBRETIA, DC.: *Baker in Journ. Linn. Soc.* XVI. 167. *Tritonia*, Benth. & Hook. f., *Gen. Plant.* III. 708. *Tritonia* sect. *Montbretia*, Pax in *Engl. & Prantl, Nat. Pflanzenf.* II. v. 155; *Baker, Handb. Irid.* 195.

Montbretia laxifolia, Klatt in *Linnaea* XXXII. 754 (1863) et in *Abhandl. Halle Naturf. Gesellsch.* XV. 359 (1882); affinis *M. securigerae*, DC., a qua differt foliis plerumque longioribus et pro rata angustioribus (9—30 cm. longis, 4—10 mm latis) superne longe sensim attenuatis, bracteis intermediis brevioribus (6—10 mm. longis) apice conspicue fuscatis, floribus paulo minoribus segmentis angustioribus. —Baker in *Journ. Linn. Soc.* XVI. 169 (1877), non in *Trans. Linn. Soc.* XXIX. 155, t. 101 (1875).

Syn. *Montbretia strictifolia*, Klatt l. cc. 753 (1863) et 359 (1882); Baker in *Journ. Linn. Soc.* l.c. (1877).

Tritonia laxiflora, Baker, *Handb. Irid.* 195 (1892) et in Dyer, *Fl. Cap.* VI. 126 (1896) var. *strictiflora* inclusa.

T. Clusiana, Worsley in *Gard. Chron.* XXXVIII. 269 (1905).

T. bracteata, Worsley, l.c. XXXIX. 2 (1906).

The most striking feature in the flowers of the plant figured in this place is the horn- or peg-shaped processes which rise at a right angle from the three lower segments of the perigone. They are firm structures which exude a small amount of a viscid matter from their tips. Their function is unknown, but there is little doubt that they play some part in the pollination of the flower. They are placed in the same position relative to the mouth of the perigone out of which the stamens and, behind them, the style and the stigmas rise as the colour-marks (Saftmale) of many other *Iridaceae* with zygomorphic flowers, and they evidently serve a similar purpose. How the apparatus works can be ascertained only by field-observation. It is these appendages or "calli," as they have been termed, on which in 1803 A. P. De Candolle established the genus *Montbretia* with *M. securigera* (Bot. Mag. t. 383 under *Gladiolus*) as the leading species. Other species with the same peculiar structure were added and the genus was recognized as such until in 1883 Bentham in *Genera Plantarum* merged it in *Tritonia*. This was done on the assumption that the calli were not a common character of the group which in the

author's mind, moreover, differed in no way from *Tritonia* but by a very slight irregularity of the flower (*vix minus regularis*). The calli, Bentham said, were in *T. flava*, to judge by the picture (Bot. Reg. t. 747), less prominent than in *T. securigera*, and they were altogether absent in *T. lineata* and *M. laxiflora*, Baker, that is the plant figured in the Transactions of the Linnean Society, XXIX, t. 101. Now an examination of the specimens of *M. flava* shows that the calli of that species are rather bigger, though shorter, than those of the other species whilst the specimens of *M. laxiflora*, Baker, have calli as marked as those of *M. securigera*. Those of *M. flava* were depicted flat, although they were correctly described as "perpendicular," whereas those of *M. laxiflora* were overlooked altogether by the author as well as by the artist. As to *T. lineata* I would remark that the figures quoted by Bentham do not tally and probably represent two different species, one with distinctly zygomorphic flowers (Bot. Mag. t. 487 under *Gladiolus*; 1799) not unlike those of a gladiolus, and the other with practically actinomorphic flowers (Red. Lil. tt. 55 and 400; 1802 and 1813). The character of the calli holds good therefore, and indeed it marks off the genus so well from the other species of "*Tritonia*" that it is not surprising that the status of *Montbretia* as a genus was undisputed for so long and in spite of the revisions it was subjected to by Klatt (1863) and Baker (1877). As to *Tritonia* itself I would confine the genus to the *Tritoniae typicae* of Bentham with *T. squalida* (Bot. Mag. t. 581) as key-species or "type," that is the section *Eutritonia* of Baker's Systema Iridacearum, but not of his Handbook or of the Flora Capensis where the name is oddly enough transferred to a section from which *T. squalida* is excluded. Concerning the other species of the *Tritonia* of the Genera Plantarum I would restore Salisbury's genus *Dichone* (see Bot. Mag. tt. 599, 629 under *Ixia*) and transfer the long-tubed species, e.g. *T. viridis* (Bot. Mag. t. 1275) and *T. crispa* (Bot. Mag. t. 678) to *Acidanthera* as Bentham and Pax have suggested or group them in a genus of their own. This would leave a score of species to account for. Some of them are clearly out of place in either of the genera mentioned, e.g. *T. Tempelmannii* which

has been recognized as the representative of a new genus *Pillansia* and *T. bongensis*, which has been coupled by Baker with the very dissimilar *T. unguiculata* in a section *Stenobasis* of *Tritonia*. A few are doubtful, as *T. lineata*; the bulk, however, seem to hang together in a natural group with zygomorphic flowers not unlike those of *Montbretia*, but with the calli replaced by colour-marks. *T. rosea* (Bot. Mag. t. 7280) might be named as characteristic of the group. Baker placed them in *Montbretia* in his *Systema*, but in *Tritonia* section *Eu-Tritonia* or *Tritonia Proper* in the *Handbook* and in *Flora Capensis*, whilst Klatt included them in his ill conceived *Tritonixia*.

Montbretia in the sense in which it is taken here comprises 6 or 7 species, all South African (from George and Fraserburg to Natal and the Transvaal) except one which is East African (Tanganyika Territory). Our species ranges from George, where Burchell collected it as early as 1814, eastwards to King William's Town, inhabiting mostly dry stony hillsides up to over 1,100 m. It varies much, apparently according to ecological conditions, in stature and in the size and rigidity of the leaves. Short- and stiff-leaved states have afforded Klatt the material from which he described his *M. strictiflora*. *M. laxiflora* is very similar to *M. securigera* which has a more westerly distribution mainly to the north and the south of the Great Karroo. The latter species has also shorter and relatively broad, often sickle-shaped, leaves with short broad tips and slightly larger flowers with broader segments.

We are indebted for the material for our plate to Mr. A. Worsley of Isleworth who has been growing the plant in his green-house and also out of doors for many years. Planted in a sheltered border along the house it has stood the winters tolerably well. It flowers in the autumn from late in September to November and ripens the seeds rapidly, mostly from the last two or three flowers, each capsule producing on the average five, but occasionally also up to fourteen seeds.* It is easily propagated by division or from seed. Mr. Worsley informs me that he had the plant from a Mr. Layton at King William's Town, Cape Colony, about 1904.

* In the capsules of wild specimens I have counted up to 18 seeds.

DESCRIPTION.—*Corm* ovoid, 7 to 10 mm. in diameter, covered with fibrous tunics and emitting short stolons which grow into corms at their ends. *Stem including the inflorescence* 15 to 50 cm. high, leafy for 5 to 25 cm., slender simple or very sparingly branched (rarely with up to 5 long branches). *Leaves* 6 to 8, distichous, equitant, linear, long tapering to a fine point, 9 to 30 cm. by 4 to 10 mm., straight and rigid or when long slightly flexuous, with a fine but distinct midrib and 1 or 2 primary lateral nerves on each side. *Spikes* erect or flexuous when young, from a few cm. to 20 cm. long, few- or up to 15-flowered; *bracts*, broad-ovate-elliptic, 6 to 10 mm. long, scarious with dark brown broad 2-toothed tips with a pointlet from the sinus, or the lowest acuminate to caudate and up to 2 cm. long; dorsal prophyll similar to the bract but shorter, 2-toothed. *Perigone-tube* about 15 mm. long, very slender almost up to the middle, then funnel-shaped, 5 to 7 mm. wide at the mouth, pale cream to flesh-colour; limb zygomorphic, as shown in the plate, more by the pose of the segments than by their shape, all segments more or less obovate-oblong to oblong, the posticous (uppermost) concave, slightly larger than the others, forming a hood over the mouth of the perigone, the anticous (lowermost) the smallest, like its lateral companions bearing an upright slightly curved horn-shaped appendage below the middle, *lateral segments* 10 to 12 mm. by 4 to 5 mm., colour as in the plate or more red to red-purple. *Anthers* conniving in front of the style and under the hood 4 to 6 mm. long, dark greyish-purple; filaments inserted in the throat, 7 mm. long. *Receptacle* oblong, very shallowly grooved. *Style* up to 18 mm. long; stigmas slightly widened upwards, 2.5 mm. long. *Capsule* oblong, blunt, up to 15 mm. long, very thin-walled. *Seeds* few to many, globose-ellipsoid, 2 mm. long, black when quite ripe.

DISTRIBUTION.—Southern Cape Colony, from George Division eastwards to King William's Town. O.S.

Fig. 1, a whole plant, $\times \frac{1}{3}$; 2, a part of the same plant in two sections, nat. size; 3, the upper half of the limb of a flower with the stamens, $\times 2$; 4, the lower half of the same with the callous appendages, $\times 2$; 5, receptacle with style and stigmas, and with the perigone removed, $\times 3$.



TAB. 9039.

CYRTORCHIS BISTORTA.

West Africa.

ORCHIDACEAE. Tribe SARCANTHEAE.

CYRTORCHIS, *Schlechter*, *Orchid.* 595 (1915): *Angraecum* sect. *Listrostachys*, *Benth. & Hook. f., Gen. Plant.* III. 583, *partim*; *Listrostachys*, *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 215, *partim*.

Cyrtorchis bistorta, *Schlechter in Beih. Bot. Centralblatt* XXXVI. ii. 129 (1918); affinis *C. Monteiroae*, *Schlechter* (*Bot. Mag.* t. 8026, sub *Listrostachy*), sed humilior, foliorum basibus imbricatis laminis magis coriaceis late linearibus apice aequaliter bilobis basi minus attenuatis et acute sulcatis minime undulatis obscure nervosis, floribus candidis minoribus, sepalis petalis labio minus acuminatis minime caudatis diversa.

Syn. *Angraecum bistortum*, *Rolfe in Kew Bull.* 1893, 65.

Listrostachys bistorta, *Rolfe in Dyer, Fl. Trop. Afr.* VII. 155 (1897).

I have repeatedly had occasion to refer in these pages to the enormous influx of material which during the last decades has enriched our herbaria and gardens, and to point out, how, by its wealth of new forms, it has frequently burst the compartments of an already outgrown system and called for a new ordering lest intolerable confusion ensue. The group of the angraecoid orchids of Africa to which the plant figured here belongs is a case in point. Rolfe described this plant originally as *Angraecum bistortum*, but he transferred it subsequently to *Listrostachys*, a genus proposed by the younger Reichenbach in 1852 for two West African orchids, *L. Jenischiana** and *L. pertusa* (*Angraecum pertusum*, Lindl.). Reichenbach did not state the affinity of the genus, but he described it very fully, and the figure of *Angraecum pertusum* in the *Botanical Magazine* (t. 4782) offered an excellent illustration. Nevertheless *Listrostachys* was misunderstood almost from the beginning and overlaid with foreign elements, partly by Reichenbach himself. When thirty years later Bentham had to deal with it in *Genera Plantarum* it claimed already 26 species, linked

* *L. Jenischiana* which Reichenbach marked as type-species is apparently synonymous with *L. pertusa*.

to the original *Listrostachys* more by the presence of two distinct stipes in the pollinarium than by any combination of characters such as make for a common facies. This artificial group he merged in *Angraecum* as a section *Listrostachys* with the remark—"forte generice separanda." defining it mainly by the character of the dual stipes, which soon became a convenient key-character that generally overrode other considerations. So with Rolfe who in *Flora of Tropical Africa* (1897) restored Bentham's section as a genus with a total of 52 species whose different natural affinities on the whole determined clearly their grouping within the genus, but found no other expression. Pfitzer in *Natürliche Pflanzenfamilien* also accepted *Listrostachys* as a genus, admitting, however, only 10 species, whilst Finet, who in 1907 published a revision of *Listrostachys*, listed 16 species in 5 sections. Both authors meant evidently to exclude a considerable number of species previously referred to the genus. For when seven years later Dr. Rudolf Schlechter in a very suggestive study on the angraecoid orchids of Africa, especially valuable on account of his extensive experience in the field, dealt with *Listrostachys* he found about 100 species on record under that name, and they were a most incongruous assemblage. No wonder that other authors preferred Bentham's simpler solution and transferred such "listrostachyses" as they had to deal with to *Angraecum*. But this helped only to swell *Angraecum* to inordinate dimensions and to make it even more incongruous than *Listrostachys*, *Angraecum* which was credited by Bentham with 25 species now covering nearly 300 species. *Mystacidium* with about 60 species was in the same position. A thorough revision of the whole group was the only way out of the chaos. How far Schlechter who undertook the task has succeeded to reduce it to order the future will show. Meanwhile we may accept his setting out of the genera as the best working basis available at present. In his scheme of the angraecoid orchids of Africa, which includes 32 genera, *Listrostachys* is maintained in the original sense denoting plants of the structure of *L. pertusa* (2 or 3 species); all the other species referred to *Listrostachys* are distributed over 16 genera, 8 of which

are new and made up almost exclusively of "listrostachyses." The largest of these new genera is *Cyrtorchis* (22 species), and it is to this genus that our plant is referable. So far three species of *Cyrtorchis* have been figured in the Botanical Magazine, viz. *C. Chailluana* (t. 5589), *C. Monteiroae* (t. 8026) and *C. hamata* (t. 8074). If these plates and the present one are compared with t. 4782, which represents *Listrostachys pertusa*, the concordance of facies and structure of the four species of *Cyrtorchis* on one hand and their differences from *Listrostachys* (in the restricted sense) on the other hand will be apparent, and, I may add, all the other species of *Cyrtorchis* follow the type illustrated by this plate. It is indeed a very natural group. Nearly all its species are West African; one has long been known from South Africa (*C. arcuata*; Syn. *Angraecum arcuatum*, Lindl., 1836), and a few have been recorded from East Africa and the African Islands of the Indian Ocean.

Our species is a native of the interior of Lagos where it was discovered by Sir Alfred Moloney, Governor of Lagos, who communicated living specimens to Kew in 1890. One of the plants flowered in 1892 and from this Rolfe described his *Listrostachys bistorta*, whose specific name is, however, a singular misnomer. Owing to some disturbance in the development of the inflorescences then in flower the tips of the spurs had been caught in the pockets formed by the bracts with the result that they were bent in the shape of an S (hence *bis torta*). The same happened in subsequent years to a specimen received at Kew from Sir Trevor Lawrence; but lately, probably under the influence of altered treatment, the inflorescences have developed normally in the way shown in the plate which was prepared at Kew in 1924. *C. bistorta* is grown at Kew in one of the tropical pits, protected from bright sunshine and watered liberally at the roots during the greater part of the year; but also during the resting season care has to be taken to prevent its drying up, else it will lose the lower leaves.

DESCRIPTION.—An *epiphyte* with an erect or ascending stem up to 5 cm. high. Leaves subdistichous, more or

less horizontally spreading from their short folded imbricate bases, *broadly linear* with obtuse *equally 2-lobed tips*, *sharply grooved along the midrib towards the base*, 7 to 12 cm. by 2 to 3 cm., firm with *straight margins*, *very indistinctly nerved*. *Racemes* up to 15 cm. long, many-flowered; internodes about 1 cm. long; bracts broad-ovate from a clasping base, 4 to 5 mm. long; pedicels including the receptacle 8 to 12 mm. long. *Flowers* secund, *about 2.5 cm. across*, *milk-white* except the spurs which are greenish at the base and brownish at the tips, the discoloration being apparently due to the action of the nectary which can be seen through the walls of the spur. *Sepals* (flattened out) ovate and 12 mm. by 6 mm. (the posticous) or lanceolate and 16 by 4 mm. (the lateral), *acute*, *hardly acuminate*. *Petals* similar to the lateral petals but shorter (12 mm. long) and more acuminate; as to pose and twist of the sepals and petals see figs. 1-3. *Lip* 1.2 to 1.5 cm. long; spur 3 to over 3.5 cm. long. *Column* stout and short, not much over 1 mm. high; rostellum narrowly lanceolate, 5 mm. long, very deeply divided, but the segments cohering except at the tips until the removal of the pollinaria. *Anther-beak* slender, 1 mm. long. *Pollinia* ellipsoid-globose, laterally attached to the long stipes which are distinct throughout, although apparently united where they are covered by the long linear gland (over 3 mm. long), which splits readily, each stipe carrying one-half of it.

DISTRIBUTION.—Nigeria; interior of Lagos. O.S.

Fig. 1, a flowering plant, nat. size; 2, a flower, $\times 1.5$; 3, a flower in longitudinal section, $\times 2$; 4, lip, flattened out, $\times 2$; 5, rostellum with pollinarium, $\times 11$; 6, pollinarium detached, $\times 11$.



TAB. 9040.

AGAPETES SPECIOSA.

Burma (?).

VACCINIACEAE. Tribe THIBAUDIEAE.

AGAPETES, G. Don ; *Benth. & Hook. f., Gen. Plant.* II. 571 ; *Erude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 55.

Agapetes speciosa, *Hemsl. in Gard. Chron.* XLI. 230, fig. 101 (1907) et in *Fedde, Rep.* VI. 319 (1909) ; arete affinis *A. Roylei*, Stapf (comb. nov. e *Vaccinio Roylei*, Kurz), sed foliis sessilibus vel subsessilibus basi breviter cordatis plerisque latioribus, racemis epedunculatis maxime contractis ideoque fasciculiformibus, floribus puniceis maioribus distincta.

We owe our knowledge of this brilliantly coloured plant to a chance introduction. Mr. J. T. Bennet-Poe, who discovered it about 25 years ago in a large clump of an orchid, said to have been *Dendrobium formosum giganteum*, thinks it came from Burma. He grew it on, and when it flowered he exhibited it at one of the shows of the Royal Horticultural Society in 1907. It was much admired and Dr. W. B. Hemsley described it shortly afterwards as a new species, *A. speciosa*. Mr. Bennet-Poe distributed cuttings of the plant to Kew, Cambridge, Edinburgh and Glasnevin. It flowered at Edinburgh, but died subsequently, as it did at Kew and Glasnevin. Cambridge, however, was successful in preserving it, and it was from material communicated by the Director of the University Botanic Garden of that town, Mr. H. G. Carter, that the present plate was prepared. Mr. Preston, the Curator of the Garden, writes, that the plant, which is now 75 cm. high, is grown as a pot-plant in compost of two parts fibrous loam, two parts fibrous peat and one part sand, and that it is kept in a warm green-house with a minimum temperature of 15.5° C. (60° F.). In the differential diagnosis I have compared *A. speciosa* with *A. Roylei*, a plant recorded from the Khasia Hills, lower Burma, and the Shan

States. This was originally described by Kurz as *Vaccinium Roylei*, then confused with *A. variegata* (Bot. Mag. t. 4303) which has a similar distribution, but a different habit and spurred anthers, and finally reduced by C. B. Clarke to a variety of *A. setigera*, a species very common in the Khasia Hills. Royle has given a coloured figure of the latter in his "Illustrations" under the name *Thibaudia variegata* which demonstrates the characters that distinguish it from our plant, particularly the elongated inflorescences and the smaller rose-coloured corollas. *A. speciosa* is evidently an epiphyte, like many of its congeners,* hence also its association with *Dendrobium formosum*, itself generally an epiphyte. Like other epiphytic *Vacciniaceae* it seems to possess a tuberous organ for water storage. Whether this is of the nature of a rootstock or of roots cannot be determined at present, as it is not advisable to take the plant up. Both modifications occur in the genus, and in *A. nana* it is the roots which have become adapted to that function (see Griffith. Notul. IV. 303; Ic. Pl. As. t. 105). The aerial stem, however, shows no thickening at the base.

DESCRIPTION.—A shrub up to over 1 m. high, perfectly glabrous with a tuberous rootstock or tuberous root (?). Leaves sessile or very shortly stalked often crowded into false whorls, lanceolate to (more commonly) broad-oblong or elliptic-oblong from a rounded auricled or subcordate base, pointed at the tip, 6 to 11 cm. by 3 to 4.5 cm., entire but with minute marginal hydathodes at distances of 3 to 5 mm., leathery, deep green and slightly glossy. Flowers in almost sessile extremely shortened racemes in the axils of the uppermost leaves; bracts minute awl-shaped; pedicels 2.5 to 3 cm. long, thickened upwards, then strongly constricted just below the receptacle. Receptacle 2 to 3 mm. high. Sepals ovate-triangular, pointed, 3 to 4 mm. long. Corolla-tube conspicuously 5-angled 3 to 4 cm. long, 1.2 to 1.5 cm. wide at the

*Griffith (Notul. IV. 302) speaking of his *Ceratostigma variegatum*, which is identical with *A. macrantha* (figured in Bot. Mag. t. 4566 as *Thibaudia macrantha*), says "Frutex epiphyticus ut omnes species," viz. the species of *Agapetes* of later authors.

middle, *crimson with V-shaped darker cross-bars* ; corolla-lobes recurved, 6 to 8 mm. long, green or more or less tinged with green and yellow. *Filaments* sparingly and minutely hairy, almost 1.5 mm. long ; anthers about 3 cm. long, tubular, dehiscing to the middle, the minute basal lobes slightly curved forward. *Ovary* 10-celled, otherwise as shown in fig. 3 ; style and stigma as in fig. 2. *Fruit* a berry (not seen in the ripe state).

DISTRIBUTION.—Probably Burma (see above). O.S.

Fig. 1, a flowering branch, nat. size : 2, a flower in longitudinal section, $\times 1.5$; 3, base of the same, $\times 3$; 4, stamen in front-view, $\times 2$; 5, base of the same in side view, $\times 6$.



TAB. 9041.

AEGINETIA INDICA.

South and East Asia.

OROBANCHACEAE.

AEGINETIA, Linn.; *Benth. & Hook. f., Gen. Pl. II. 982*; *G. Beck in Engl. & Prantl, Nat. Pflanzenf. IV. 3b. 129.*

Aeginetia indica, Linn., *Spec. Plant. 632* (1753); ab altera specie generis scapis simplicibus unifloris esquamosis et floribus minoribus ore haud luteis plane diversa.—Roxb., *Cor. Pl. J. 63 t. 91* (1795) et *Fl. Ind. III. 30* (1832); Blanco, *Fl. Filip. ed. II. 342* (1845); Reuter in *DC. Prodr. XI. 43* (1847); Miquel, *Fl. Ned.-Ind. II. 712* (1856); Hook. f., *Fl. Brit. Ind. IV. 320* (1884); Hemsley in *Journ. Linn. Soc. XXVI. 220* (1890); Makino, *Ill. Fl. Jap. t. 59* (1891) et *Phan. Jap. Ic. II. t. 80* (1902); Schum. & Lauterb., *Fl. Deutsch. Schutzgeb. Südsee. 540* (1901); Kusano in *Bot. Mag. Tokyo XVII. 81-84 c. ic. in p. 82, t. 1* (1903) et in *Bot. Centralblatt, XCIII. 242* (1903) et in *Bull. Col. Agric. Tokyo VIII. 59-78, t. vii* (1908) et in *Beih. Bot. Centralblatt, XXIV. 1. 286-300, tt. xi-xii* (1908); Matsumura, *Ind. Pl. Jap. 575* (1912); Koorders, *Excursionsfl. Java III. 187* (1912); Solereder in *Gartenfl. 1919, 295-304, figs. 30-35.*
Syn. Orobanche Aeginetia, Linn. *Spec. Plant. ed. II. 883* (1763).
Tsjam Cumulu, Rheede, *Hort. Mal. XI. 97, t. 47* (1692).

Aeginetia is a small genus of *Orobanchaceae* comprising only two or possibly three species, *A. indica*, which is the subject of this plate, *A. pedunculata* and the very problematical *A. Centronia** of Java. All are Indo-Malayan types, but whilst *A. pedunculata* is confined to India and the tropical and subtropical mainland of East Asia, *A. indica* occurs all over the Indo-Malayan region from India to New Guinea and also in the temperate zone of Eastern Asia. In the outer Himalaya it ascends to 1,200 m., but in the extreme north-east of Burma it has been collected up to 2,100 m. by Forrest. In China it finds its northern limit at about 31° N., whereas in Japan it has been recorded as far north as the island of Yezo. Although very variable as to height and size and the colour of the flowers, it is on the whole very uniform in other respects. It was already known to Van Rheede

* This was originally described by Blume as *Centronia mirabilis*. It has since passed through the following changes of name: *Tronicera mirabilis*, Steud. (1841), *Centronota mirabilis* DC. (1843), *Gasparinia mirabilis*, Zoll. & Mor. (1845) and *Aeginetia Centronia*, Miq. (1856). Koorders suggests that it is synonymous with *A. indica*.

who gave a good figure of it in his *Hortus Malabaricus* (1692) and there has never been any serious divergence of opinion as far as its status as a species and its affinities are concerned. It is in some parts of its area a common parasite on grasses and it occasionally invades cultivated land, but so far it has rarely become really troublesome as in the sugar-cane-plantations of Bonin. It is remarkable that the life-history of such a widely distributed and conspicuous plant has until quite recently never been studied. It was left to a Japanese botanist, Professor Shunsuke Kusano of the Agricultural College of Tokyo, to elucidate it. According to him the host-plants of *Aeginetia indica* are (in Japan) generally grasses, either in the wild state, e.g. *Miscanthus sinensis*, or in cultivation, as in sugar-cane-plantations and rice-, maize- and millet-fields, but it has also been found on *Carex Morrowii*, a common sedge of the woods of Japan. In artificial cultures it has been grown on other monocotyledonous plants with more or less success, but dicotyledons have so far proved unfit to serve as host-plants. It seems that the seeds germinate only in the neighbourhood of the growing roots of other plants; but whilst germination may be induced by almost any living root, it does not proceed beyond the initial stage unless it is in contact with the roots of certain monocotyledons. The first change that occurs on germination setting in consists in the general swelling of the embryo, and particularly of the epidermal cells at the radicular end which break through the delicate testa and soon send out highly sensitive hairs. If these come in contact by their tips with a young host-root, they attach themselves firmly to it and by coiling or general contraction draw the seed close to the root, very much after the manner of a tendril, hence Kusano's term "tendril-hairs." As soon as the contact with the host-plant has been established, but not before, the embryo begins to grow rapidly with the result that a spheric or ovoid tubercle is formed which soon far exceeds the remainder of the seedling. Then the frontal part of the tubercle enters the host-root and develops into a haustorium whilst the bulk of it grows into a stunted stem with roots spreading from the collar and with buds of flowers forming in the axils of its scales. As the roots of the parasite meet

other roots of the host they form at the point of contact secondary tubercles which behave like the primary, and as the secondary tubercles may repeat the process, a network of roots of considerable size may be formed. This is the "root of fleshy interlaced fibres" of Hooker's account of the plant in Flora of British India. Another peculiarity of the plant consists in the exudation of large quantities of mucilage in the calyces which sometimes become loaded with it. This mucilage is secreted by glands which are scattered over the inner side of the calyx, and its function is evidently the same as that of the secretion of the water-calyces of *Spathodea campanulata* or *Parmentiera cereifera*.

The plant from which our plate was prepared was one of several which had been raised from seed received in 1923 from Dr. L. Diels, the Director of the Botanic Garden at Dahlem, Germany. Dr. Diels, himself, had the plant from Erlangen where the late Professor Solereder had been growing it for some time from seed communicated to him by Herr August Loher, the well-known collector in the Philippines. At Kew some of the seeds were sown on the roots of pot-grown plants of sugar-cane and others in pots together with the seeds of *Setaria plicatilis*. The young shoots showed over-ground early in the spring and by the middle of April, five months after sowing, flowering set in, and it continued throughout the summer; some more scapes were thrown up in the autumn and a few are coming up even now at the end of December. The size of the scape and flowers and their colouring varied very much, the corollas being whitish or pale mauve or pale rose outside, with dull or deep violet to red-purple lobes and a deep-red-purple or blood-red throat down to the insertion of the stamens below which the tube is more or less white. Most of the flowers set fruits which ripened their seeds within two months. Under natural conditions *A. indica* flowers from July onwards and often until late in the year. At Kew the plant is treated as a stove-plant and as such it has grown very freely, but considering that *A. indica* occurs as far north as Yezo it may be expected to lend itself just as well to green-house-treatment with maize, millet or rice as host-plants. The seeds are produced in great abundance

and they retain their power of germination for two or three years. The strain of the parasite on the host-plant may be sufficiently severe to kill it. Thus the sugar-cane on which it was grown at Kew succumbed ; but the plants of *Setaria plicatilis* which were sown with the *Aeginetia* are still in full vigour throwing up new clusters of the parasite which have a good chance of living through the winter.

DESCRIPTION.—A *parasite* on the roots of grasses ; main axis stunted, rarely more than 1 to 2 cm. long, bearing lanceolate or oblong fleshy yellow or red scales. *Flowering scapes* slender, up to 40 cm. high, bractless, one-flowered, pale-yellow or almost orange with red streaks. *Calyx* a boat-shaped spathe, lanceolate to oblong or broad-ovate in side view, acute or acuminate, 2·5 to 4 cm. long, split down in front to the middle or somewhat beyond it. *Corolla* in general shape as shown in the plate, but varying in length, width and colour (see above), always constricted at the insertion of the stamens, exceeding the calyx or shorter than it. *Stamens* 4 ; as shown in fig. 3 ; the posticus with spreading anther-cells, one fertile, the other barren, fleshy, ending in a fine point (fig. 4, below) ; the anticus with a single anther-cell and a sharply pointed hump in place of the other (fig. 4, above). *Pistil* as shown in fig. 5 ; stigma large, disc-shaped, exposed in the throat of the corolla ; placentas 4, pinnately lamellate. *Capsule* ovoid, 1·2 to over 2 cm. long, dehiscing by 4 lateral slits. *Seeds* very numerous, ellipsoid, 0·3 mm. long ; testa thin, reticulate.

DISTRIBUTION.—Throughout the Indo-Malayan region to China and Japan as far as Yezo. O.S.

Fig. 1, a group of flowering scapes with their host-plant (sugar-cane), nat. size ; 2, lower half of a corolla, showing the constriction at the insertion of the stamens, nat. size ; 3, a corolla opened out from the front, nat. size ; 4, stamen of the anticus pair above, of the posticus below, $\times 2$; 5, pistil, nat. size ; 6, a ripe capsule, nat. size ; 7, cross-section of an ovary, $\times 2$; 8, a seed, $\times 60$.



TAB. 9042.

OCHNA SERRULATA.

Natal.

OCHNACEAE. Tribe OURATEAE.

OCHNA, Linn.; *Benth. & Hook. f., Gen. Plant.* I. 317; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* III. 6. 139.

Ochna serrulata, Walp. Rep. V. 400 (1846); arctissime affinis *O. atropurpureae*, DC. (1824*), sed foliis lanceolatis vel lanceolato-oblongis plerumque 3—5 cm. longis 1—1.5 cm. latis distincta.

Syn. *Ochna atropurpurea*, Hook. in Bot. Mag. sub t. 4519 (1850) partim; Harvey in Harvey & Sond., Fl. Cap. I. 448 (1860) partim, non DC.; Wood, Natal Pl., t. 381 (1906).

O. multiflora, Williams in Journ. R. Hort. Soc. V. clx (1879), nomen; Garden XXII. 574 cum ic. (1882) et XXXIII. 250 (1888); Illustr. Gartenzeit. 1883, 394 et 1887, 374, fig. 73; Le Jardin X. 283 cum ic. (1888) et XXIV. 229 (1910); Journ. Hort. ser. 3, XLIV. 209 (1902); Gard. Chron. XL. 212, ic. suppl. (1906); non DC.

Diporidium serrulatum, Hochst. in Flora XXVII. i. 304 (1844).

D. uniflorum, Van Tieghem in Journ. de Bot. XVI. 126 (1902) et in Ann. Sc. Nat. ser. 8, XVI. 360 (1902).

D. leiocladum, Van Tieghem in Ann. Sc. Nat. l.c.

In The Garden of December 30, 1882 (Vol. XXII. 574) an editorial article will be found, under the heading "*Ochna multiflora*." It contains a description and a coloured figure (t. ccclxix) of a plant grown under that name in the Victoria and Paradise Nurseries of Mr. B. S. Williams at Upper Holloway, North London. Apart from the general statement that it was a native of Tropical Africa and the suggestion that it had been lost to cultivation owing to difficulties of propagation no account was given of the history of its introduction. The name itself, so it was said, had caused some misapprehension; the plant was therefore submitted by the editor to Mr. Hemsley, who considered it identical with *O. atropurpurea* of South Africa and gave a detailed account of that species and its allies. This was

* *Ochna atropurpurea*, DC. in Ann. Mus. Paris XVII. 412 (1811), exclusively based on *Arbor africana* . . ., Pluk. (Alm. t. clxiii. figs. 1, 2, ii. 41; 1696), is an Indian plant (see Pluk. Amalth. Bot. 19; 1705), namely *O. cordata*, Thw.

embodied in the article, the editor adding "but as Mr. Williams intends to distribute it in the spring under the name of *O. multiflora*, we have adhered to the latter name." The plant was presently put on the market* and distributed to English and continental gardens. It was repeatedly reported on in gardening papers without its name ever being questioned until in 1902 Van Tieghem, pointing out that it was misnamed and being under the erroneous impression that there were two species involved, suggested the names *Diporidium uniflorum*† and *D. leiocladum* for it. The confusion was indeed so obvious that it is only to be wondered that it could ever have been supported, *O. multiflora* being an old West African species (1810) with large broad ovate or elliptic leaves and many-flowered racemes. The rejection of Hemsley's determination may have been due to the fact that the latter contained an element of error in so far as he referred to the figure of "*O. atropurpurea*" published in the Botanical Magazine on t. 4519 (1850) which represents a plant with entire leaves and subcorymbose inflorescences—*O. arborea*. Had he limited himself to the identification of Williams's plant with De Candolle's *O. atropurpurea*, as defined in the Prodrômus and supported there by the reference to Burchell's no. 4021, he would have been very nearly correct, the differences between them being such as would probably weigh with not a few botanists as merely "varietal." It was, however, on account of those differences that Hochstetter described his *Diporidium* (*Ochna*) *serrulatum* as distinct from *D.* (*Ochna*) *atropurpureum*. Now the plant figured here undoubtedly connects the *O. multiflora* of gardens with this *Diporidium serrulatum* of Hochstetter or, as we shall call it, *Ochna serrulata* of Walpers. It has been in cultivation at Kew for a great many years as *O. multiflora* and tallies very well with the figure in The Garden, referred to above, whilst it also agrees with Krauss's specimens which form the technical foundation of the species *O. serrulata*, so that the *O. multiflora* of Williams (or of gardens) becomes now *O. serrulata* of

* Williams, Plant Catalogue of 1884, 14, and of 1885, 27, with fig. on p. 28.

† *Diporidium* is the generic name proposed by Bartlet and Wendland (1825) for the group of *Ochna* to which the plant belongs.

Hochstetter. But what was the origin of the plant of the gardens? Krauss collected the originals of *O. serrulata* "in silvis" in Natal Bay in 1839 (no. 437). Later on Dr. P. C. Sutherland (1857?) and John Sanderson (1860) collected it again, the former near Durban and the latter in "Natal," and Sanderson's specimen in particular is so much like the fruiting branch figured here that it might have been cut from the same plant. Sanderson, who was a resident of Durban and a correspondent of Sir William Hooker, came to Kew in 1861, bringing with him a case of plants and seeds. They are not listed specifically in the Kew records, but we may assume that the consignment contained the dried specimen of 1860 which is now in the Herbarium as well as seeds collected at the same time and it would be from the latter that the Kew plants of "*Ochna multiflora*" were originally raised. Whether Williams's plants had the same origin, as is not improbable, we cannot decide at present with certainty.

O. atropurpurea and *O. serrulata* present themselves in the herbaria as fairly homogeneous forms distinguishable by foliage and facies, and geographically they are so placed that *O. serrulata* is confined to a corner on the south-eastern edge of the very large area of *O. atropurpurea* which extends from Caledon Division in Cape Colony to Barberton in South-eastern Transvaal. As the herbarium material of *O. atropurpurea* available is large, covers the whole area of the species and has accumulated from many distinct collectings spread over more than 100 years, it is not probable that the *serrulata*-type would have escaped the collector's notice if it were merely a phase of fluctuation or an instance of response to ecological conditions in a generally plastic species; nor has *O. serrulata*, although in cultivation for more than fifty years, shown signs of reversion to *O. atropurpurea*. It seems therefore reasonable to retain for it at present the specific rank which was given to it by its author. *O. serrulata* has so far been treated at Kew as a stove-plant, and it has done best in the Mexican House where it was planted in the ground and where it has developed into a graceful shrub over 1 m. high. In the pits and in the Palm House it has been grown as a pot-plant of much smaller dimensions; but considering its origin

it may be worth while to try it in the green-house with other Natal plants. As to soil a mixture of peat and leaf-mould with a good deal of sand has been recommended. As it fruits readily propagation by seed would seem to be the simplest method of multiplication. The plant is very ornamental. Specimens have been seen up to over 1.5 m. high and adorned all over with the sweet-scented pure yellow flowers and at the same time with fruits in all stages of development, the sepals and the torus showing a passage from green through a lurid pink to vermilion and the drupelets from green through turquoise- and lapis lazuli-blue to a deep bluish-black.

DESCRIPTION.—A glabrous *shrub* up to 2 m. high; bark greyish-brown, crowded with numerous lenticels. *Leaves lanceolate to lanceolate-oblong, acute or rounded at the base, more or less blunt or, more rarely, acute at the tip, acutely and finely serrate along the margin, mostly 3 to 5 cm. by 1 to 1.5 cm., thinly coriaceous or almost papery, bright green and slightly glossy, nerves and transverse veinlets elegantly raised on the face; leaf-stalks about 2 mm. long. Flowers solitary in the axils of the leaves or terminal on short spurs; flower-stalks 1 to 1.5 cm. long, nodding in the fruit. Sepals broad-elliptic in the flower, growing to double the size (1.5 to 1.8 cm. by 6 to 7 mm.), in the fruit becoming oblong and reflexed and turning vermilion-red. Petals as shown in the plate (figs. 1, 3), about 1 cm. long. Anthers 3 mm. long. Pistil as in fig 6; style 7 mm. long. Drupelets deep bluish-black, shining, globose-ellipsoid, 8 mm. by 6 mm.; endocarp transversely finely ridged (fig. 8). Cotyledons equal or almost equal; the basal radicle and the plumule very small.*

DISTRIBUTION.—Natal, in the littoral forest. O.S.

Fig. 1, a flowering branch, nat. size; 2, a flower-bud, $\times 2.5$; 3, a petal, $\times 2$; 4, a dehiscent perfect stamen, $\times 8$; 5, an imperfect stamen, $\times 2$; 6, a pistil, $\times 8$; 7, a fruiting branch, nat. size; 8, endocarp, seen from within, $\times 2$; 9, drupelet and seed in longitudinal section, $\times 2$.



TAB. 9043.

CLADRASTIS SINENSIS.

China.

LEGUMINOSAE. Tribe SOPHOREAE.

CLADRASTIS, Raf. ; *Benth. & Hook. f., Gen. Plant.* I. 554 ; *Taubert in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 197.

Cladrastis sinensis, *Hemsl. in Journ. Linn. Soc.* XXIX. 304 (1892) ; affinis *C. Wilsonii*, Takeda, sed foliolis oblongis triplo longioribus quam latis, floribus minoribus, nempe calyce cum receptaculo 3—4 mm. longo, carina 12—13 mm. longa, calyce insuper minus alte lobato.—A. Henry in *Elwes & Henry, Trees of Great Britain & Ireland*, II. 450 (1905) ; Bean in *Kew Bull.* 1913, 164 cum ic. ; Takeda in *Sargent, Plant. Wilson.* II. 97 (1913) et in *Not. Bot. Gard. Edinb.* VIII. 98, t. xxvi. figs. 1–6 (1914).

Among the many discoveries which mark the work of A. Henry, E. H. Wilson and others in China those of new links connecting the floras of East Asia and North America are not the least interesting. *Sassafras tsumu* and *Liriodendron chinense* are noteworthy instances from the list of arboreous species ; *Cladrastis sinensis* and *C. Wilsonii* are other additions no less remarkable. *Cladrastis* was originally (1825) based on Michaux' *Virgilia lutea*, a rare and beautiful tree of the woods of Central Kentucky, Tennessee, the extreme south-west corner of North Carolina and the Orzak mountains on both sides of the Missouri-Arkansas frontier. It was for a long time considered the only representative of the genus until in 1865 Benthams united the equally monotypic *Maackia*, a genus proposed by Ruprecht and Maximowicz for a tree of the Amurland, with *Cladrastis*. Our present knowledge of the group, however, renders this reduction untenable and *Maackia*, for which Takeda claims five species, is once more recognized as distinct. On the other hand Hemsley in 1892 actually established the presence of an undoubted congener of the American *Cladrastis* in China, namely *C. sinensis*, the plant figured in this place. It had been discovered by Mr. Antwerp E. Pratt apparently in the neighbourhood of Tachienlu,

West Szechuan, in 1890. Since then Wilson has recorded it from Fang in Western Hupeh (1901, no. 2398) and from Mt. Omei and Wa-shan in Szechuan (1907 and 1908). It was the first named locality that afforded the seed from which Messrs. Veitch at Coombe Wood introduced the plant into cultivation. There are several young trees of that introduction in the Arboretum at Kew. They are now about 3 m. high and one of them flowered for the first time in 1923. It was this tree that supplied the material for our plate. *C. sinensis* is a graceful and handsome tree of medium or even large size, a fine portrait of which may be found in the Kew Bulletin for 1913, facing p. 165. It is common in moist woods in West Szechuan at altitudes of 1,300 to 2,500 m., where it flowers freely, the large white or pale pink sweet-scented panicles standing well above the foliage. It has proved perfectly hardy in the South of England and promises to be an ornamental addition to the trees of our parks and gardens.

We have compared it above with *C. Wilsonii*, one of the discoveries of the explorer after whom it was named. This has a more eastern distribution, that is from the Szechuan-Hupeh frontier down the Yangtse-valley to Kuling in Kiangsi. It approaches more to the American species, *C. lutea* (see Bot. Mag. t. 7767), than *C. sinensis* in so far as it has broader ovate leaves and larger more loosely arranged flowers than the latter,* and the same applies to the Japanese *C. shikokiana*, described by Makino from Central Hondo. If we finally add *C. platycarpa*, also from Central Hondo, a type very similar to our plant in the shape of the leaflets, and in the flowers, but differing rather strikingly in having stipellate leaves and winged pods, we have at present to record four Asiatic species of *Cladrastis* against the solitary and rare *C. lutea* of America.

DESCRIPTION.—A tree up to over 20 m. high and up to 3 m. in girth; branchlets rusty-villous at the base;

* Mr. Takeda says the flowers of *C. Wilsonii* are smaller than those of *C. sinensis*, but my measurements for *C. Wilsonii* are—calyx (including receptacle) 5–7 mm. and for the corolla (keel) 17–20 mm.

bark brown to almost black. *Leaves* imparipinnate with 5 or 6 (rarely more) shortly stalked leaflets on each side; spindle 12 to 20 cm. long, swollen at the base, enclosing 2 or 3 densely villous buds, one of which is much larger than the rest, like the stalklets of the leaflets variously pubescent or villosulous or almost quite glabrous; *leaflets* oblong from a rounded base, pointed or slightly blunt, the longest 6 to 10 cm. by 2 to 3 cm., dark green and glabrous on the face, somewhat glaucous and downy along the midrib on the back or almost quite glabrous. *Panicles* terminal, erect, 15 to over 30 cm. by 10 to 15 cm., dense or loose, finely rusty-downy; branches spreading; pedicels 5 to 8 mm. long. *Calyx* (including the receptacle) 3 (rarely 4) mm. long, very shortly or obscurely toothed, finely and appressedly rusty downy. *Corolla* white, more or less flushed with pink with a yellow blotch on the standard, sweet-scented, measured by the keel 12-13 mm. long; otherwise as in figs. 2, 3 and 4. *Stamens* free inserted high up on the receptacle. *Ovary* very finely downy or almost silky, borne on a stipe 1.5 mm. long; style 3 mm. long. *Pod* oblong, lanceolate-oblong or rarely linear, mostly 4 cm. by 1 cm., but occasionally almost twice as long, flat with a fine slightly thickened margin, glabrous or with very few hairs when mature. *Seeds* 1 to 3, 5 mm. long, as in fig. 8.

DISTRIBUTION.—Central China, from Western Hupeh to Western Szechuan. O.S.

Fig. 1, top of a flowering branch, nat. size; 2, 3 and 4, a flower seen in front, side and top-view, $\times 2$; 5, a flower with the petals removed, $\times 4$; 6, the same cut open with the ovary in longitudinal section, $\times 5$ (here, as in figs. 2, 3 and 5, the very fine hair-covering of the receptacle and calyx and of the pistil has been omitted by oversight); 7, a pod, nat. size (drawn from Wilson no. 2398); 8, a seed, $\times 4$, from the same source.



TAB. 9044.

CROCUS KOTSCHYANUS.

Asia Minor.

IRIDACEAE. Tribe CROCEAE.

CROCUS, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 693; *Pax in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 142.

Crocus Kotschyanus, *C. Koch in Index Sem. Hort. Berol.* 1853, 17 (1854) et in *Ann. Sc. Nat. ser. 4, I.* 351 (1854); affinis *C. vallicolae*, Herb., et *C. Suwarowiano*, *C. Koch*. sed perigonio roseo-purpureo ore luteo et aurantiaco-maculato necnon eius segmentis obtusis vel subacutis satis distinctus.—Kotschy, *Reis. Cilic. Taurus* 381 (1858); *Walp. Ann.* VI. 51 (1861); *Tchihatcheff, Asie Mineure*, III. Bot. II. 525 (1860); *Baker in Journ. Linn. Soc.* XVI. 83 (1877) et in *Journ R. Hort. Soc. New Ser.* IV. 115 (1877).

Syn. *Crocus zonatus*, *Gay ex Tchihatcheff, l.c. (nomen)*; *Klatt in Linnaea* XXXIV. 682, 720 (1866); *Baker in Gard. Chron.* 1873, 1432; *Maw in Gard. Chron.* XVI. 234 (1881) et *Monogr. Crocus* 85-88, t. iv. (1886); *Boiss., Fl. Or.* V. 98 (1885); *Siehe in Gartenflora*, 1896, 172.

The plant which we figure here has been known in literature and in horticulture as *Crocus zonatus* and it is therefore with some reluctance that we go back to the original name, *C. Kotschyanus*, which, however, should never have been suppressed. *C. Kotschyanus* was described by Carl Koch in 1854 from specimens and bulbs which the Botanic Garden at Berlin had received from Moschkowitz and Siegling of Erfurt the previous year. They had been gathered by Theodor Kotschy on schistous soil in alpine pastures and cedar-woods in the Bulgar Dagħ, Cilicia, between 15 and 20 kil. west of Gulek Bogħas (the Cilician Gates of the ancients) or about 50 kil. N.N.W. of Tarsus in the late summer and the autumn of 1853. Two years later it was collected again by B. Balansa (no. 823) in the same district "On the heights dominating the defile of the Cilician Gates," and on this collecting J. Gay based his *C. zonatus* (ms.; 1856), evidently unaware of Kotschy's earlier discovery. P. Tchihatcheff took up Gay's species in 1860 along with *C. Kotschyanus* of Koch, which he considered distinct, and without giving a description of it. This

was supplied in 1866 by F. W. Klatt, who quoted under it Balansa's no. 823 and Kotschy's no. 316, which, however, is *C. cancellatus* in the Kew Herbarium.* J. G. Baker who in 1873 had accepted Gay's *C. zonatus* as a distinct species, represented only by Balansa's plant, referred it four years later to *C. Kotschyanus* in his *Systema Iridacearum* (1877). Subsequently (1882) Maw, arguing that Herbert had already (1846) used the name "*Kotschyanus*" for a variety of *C. cancellatus* and that "Koch's name *Kotschyanus* must have applied to Herbert's *cancellatus* as it does not appear that Gay's *zonatus* had ever been collected prior to Balansa's visit to the Taurus in 1855," decided for *C. zonatus* as the name to be used for our plant. The first part of the argument implies a principle which very few will admit—it would indeed be a new and limitless source of name-changes—whilst as to the second part of it, he was clearly mistaken in the fact.

C. Kotschyanus grows in its home associated with *C. cancellatus*, both covering the ground of the open cedar- and juniper-forests and of alpine pastures with myriads of flowers in the autumn. A photograph by A. Siehe in the *Gardeners' Chronicle* for February 5th, 1898, and of October 27th (1917), gives a good idea of a colony of our *Crocus*. Its affinity seems to lie with *C. vallicola* and *C. Suwarowianus*†, species of the Pontic ranges and of Armenia and the Caucasus, which, however, differ very distinctly in the colour of the flowers (pale cream with or without fine purple veins) and the former in the very acute or drawn-out tips of their segments. *C. Kotschyanus* was little known in gardens until August Siehe introduced it in 1896 from Kotschy's and Balansa's original collecting-ground. It is perfectly hardy and easy to grow and it multiplies very rapidly, flowering with us as in its home late in September and producing its leaves in the following spring when also the seeds ripen. I may add that Siehe

* There may have been some confusion in the issue of that number as Maw says that he found *C. zonatus* under it in the De Candollian Herbarium.

† I prefer to treat *C. Suwarowianus* as a distinct species. Maw has already pointed out the characters in which it differs from *C. vallicola* and suggested that it might be specifically distinct. Lapsky in his *Flora Caucasica* also considers it so.

describes the soil in which he found it growing as loamy. The flowers open out wide in bright warm sunshine and are then particularly charming as the contrast between the soft rose-purple or lilac of the perigone and the rich yellow centre shows to full effect.

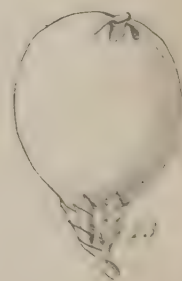
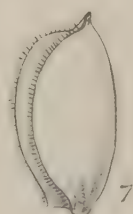
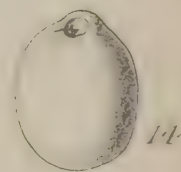
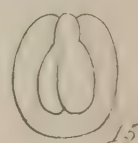
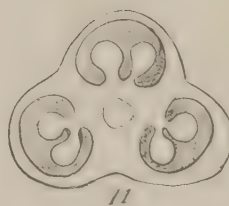
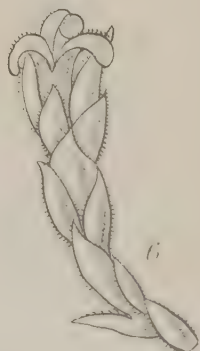
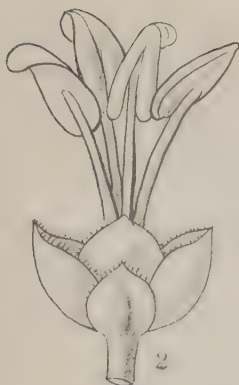
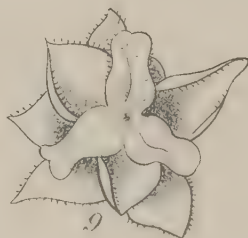
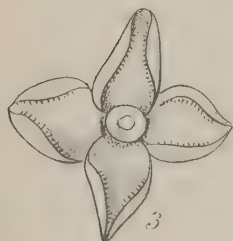
DESCRIPTION.—*Corm* much depressed, 2·5 to 3 cm. in diameter, 1 cm. high; *tunics thin, membranous, finely parallel-nerved*, brown. *Sheathing cataphylls* 4 to 7, the uppermost up to 7·5 cm. long. *Foliage-leaves* 5-7, dormant during the winter, when fully developed narrowly linear, 15 to 30 cm. by 3 to 5 mm., *with the stout keel almost square in cross-section* (fig. 10), with a white band along the shallowly channelled face. *Flowers* 1 to 3 with a common (involucral) spathe ultimately 5 to 7 cm. long and with 0 (?) or 1 or 2 long narrow finely two-keeled dorsal prophylls; pedicels in the fruiting condition up to over 5 cm. long; special (floral) spathe one* (always?), produced at the fruiting stage into a long beak, including it up to 5·5 cm. long. *Perigone-tube* up to 15 cm. long, *whitish without, yellow in the throat* with a small tuft of short hairs at the insertion of the stamens; *segments oblong-elliptic to oblong, blunt or slightly pointed*, 2·5 to 4·5 cm. by 1 to 1·7 cm., *rose-purple or lilac except at the yellow base, which carries two semicircular orange blotches*. *Anthers* creamy-white, 1·5 cm. long; filaments orange, 7 mm. long. *Stigmas* and the short style-arms orange, the former truncate and papillosely fimbriate. *Capsule* as in fig. 9, hardly more than 2·5 cm. long. *Seed* almost globose, of a pale cream-colour, 2·5 mm. in diameter.

DISTRIBUTION.—Cilicia, Bulgar Dagh at about 2,000 m.; Syria† (?). O.S.

* Maw describes it as diphyllous with the inner spathe ligulate.

† Boissier in *Flora Orientalis* quotes "*C. zonatus*" as collected by Blanche between Diman and Hasrun in the Lebanon (below the famous cedar-groves), and Maw observes that Blanche's specimens in the Boissierian Herbarium are apparently that species. Dr. Post in his *Flora of Syria and Palestine* indicates it as a native of the alpine and sub-alpine zone of the Lebanon and Mt. Hermos and of the neighbourhood of Aintab in Syria. I myself have seen no specimens referable to *C. Kotschyanus* from any of these districts.

Fig. 1, a flowering plant, nat. size ; 2, half a flower, upper part, nat. size ; 3, an anther, $\times 3$; 4, an ovary, $\times 5$; 5, style-arms and stigma, $\times 8$; 6, a plant in foliage, nat. size ; 7, a fruiting scape with an innovation-bud at its base, surrounded by the foliage-leaves and with the sheathing cataphylls or their remains removed, nat. size ; 8, a fruiting scape with the common (involucral) spathe cut open and flattened out on the right and with a dorsal prophyll between it and the scape, nat. size ; 9, a capsule, nat. size ; 10, a cross-section through a leaf, diagrammatic, $\times 5$.



TAB. 9045.

SARCOCOCCA RUSCIFOLIA.

West China.

BUXACEAE. Tribe BUXEAE.

SARCOCOCCA, Lindl.; *Baill., Monogr. Buxac.* 48 (1859); *Müll. Arg. in DC. Prodr.* XVI. I. 11; *Benth. & Hook. f., Gen. Plant.* III. 266; *Pax in Engl. & Prantl, Nat. Pflanzenf.* III. 5. 132.

Sarcococca ruscifolia, *Stapf in Kew Bull.* 1910, 394; inter species trigynas superne puberulas foliis ovatis acutissimis circiter duplo longioribus quam latis triplinerviis insignis.—*Rehder & Wils. in Sargent, Plant. Wilson.* II. 163 (1914) pro maxima parte.

Syn. *S. pruniformis*, *Hemsl. in Journ. Linn. Soc.* XXVI. 418 (1894); *Diels in Engl. Bot. Jahrb.* XXXIX. 431 (1900), non Lindl.

Three conspicuous characters distinguish *Sarcococca* from *Buxus*, its nearest ally, namely the alternate leaves, the inversion of the position of the male and female flowers whenever the inflorescences are bisexual, the male flowers being placed above the female (saving casual irregularities) and the fleshy berry-like fruits. However, though *Sarcococca* is easily recognised as a genus, it is a very difficult matter to trace its genetic differentiation and to render it in definite taxonomic terms, so difficult indeed that Sir Joseph Hooker in “*Flora of British India*” (1887) admitted—“After a long study I am obliged to unite all the Indian forms under one species,” distinguishing, however, under this species (*S. pruniformis*, Lindl.) three varieties beside the *S. pruniformis proper*. Yet before him Baillon (1859) had already recognized six and J. Müll. Arg. (1869) four species, all but one or two Indian. Hemsley in “*Index Florae Sinensis*” (1894) also recorded only one species from China, viz. *S. pruniformis*, Lindl.,* quoting under it about a dozen

* Lindley's *S. pruniformis* (1826), as illustrated by his plate, represents his var. *latifolia*=*Pachysandria* (?) *coriacea*, Hook. (1826)=*S. coriacea*, Sweet (1827); it is a native of northern India from Nepal to Manipur and Silhet. Lindley's var. *angustifolia* of *S. pruniformis* is based on *Buxus saligna*, D. Don (1825)=*Sarcococca saligna*, Müll. Arg., a native of the Himalaya west of Nepal and of north-eastern Afghanistan. Neither occurs in China.

specimens from western Hupeh and Szechuan. Since then a great accession of specimens has accrued, mainly from Wilson's and Forrest's collections, but also from other sections of the area of the genus which covers the whole of tropical and subtropical Asia with the exception of Arabia and the eastern part of the Malayan Archipelago. This suggested to me some years ago a fresh taxonomic survey of the forms that can be distinguished among the material now available. Space forbids me to enter into this problem at length, but I may state that I have come to the conclusion that the forms clearly recognisable amount to about fifteen or sixteen. All of these but four have already been described, either as species or varieties, among them the plant figured in the accompanying plate. It is one of the best known and generally admitted species. It was discovered by Professor Augustine Henry in the glens in the neighbourhood of Nanto near Ichang, Hupeh, in 1876, and it has since frequently been collected in the district by Henry himself and by Wilson and others. According to Wilson it is common there on limestone cliffs. Westwards it has been traced as far as the country near Tachienlu and south-westwards to the Tibetan frontier in $28^{\circ} 12'$ N. in the valley of the Salwin. It ascends nowhere to great altitudes; 2,000 m. appears to be the upper limit of its vertical range in Hupeh (Silvestri) and 2,400 m. in north-west Yunnan (Forrest). *S. ruscifolia* was introduced to cultivation in 1901 by Messrs. Veitch who raised it from seed collected by Wilson in Hupeh the previous year (seed no. 927). Kew obtained plants from their nursery at Coombe Wood and the species has since been grown in the Royal Botanic Gardens in the open where it is quite hardy, as well as in the Temperate House. Indoors it has been treated as a pot-plant, when it remains low and bushy, and from such a plant our plate has been prepared. In the open it requires shady situations under trees. *S. ruscifolia* when in flower or fruit is very attractive owing to the pleasant contrast of the bright glossy foliage and the white sweet-scented male flowers and the brilliant red fruits. It flowers in the winter, and flowering as well as fruiting is long protracted. It

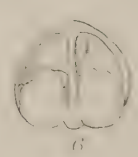
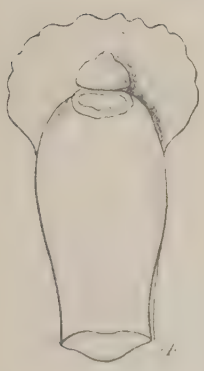
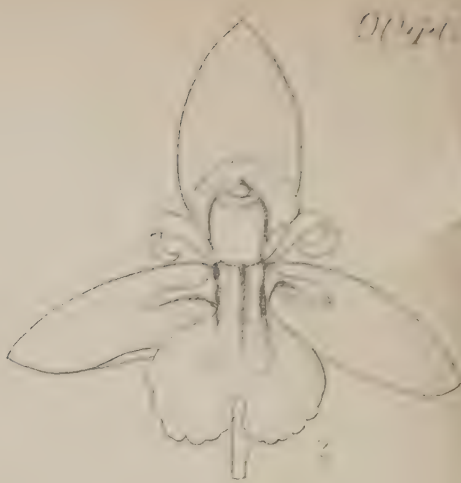
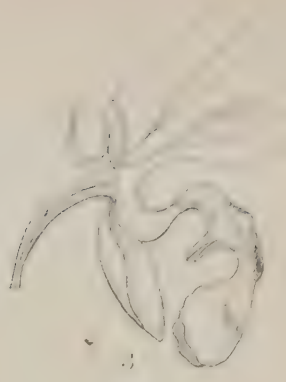
may be added that Mr. M. Y. Orr of Edinburgh has observed polyembryony in specimens of *S. ruscifolia*, which he had received from an estate in Mid-Lothian. There were generally two, but in exceptional cases as many as seven, embryos present in one seed.

DESCRIPTION.—A shrub from less than 0·5 to 1 m. high; branches finely downy when young, remaining green a long time. Leaves orate, more or less rounded or shortly acute at the base, with very finely pointed tips, 3 to 5 cm. by 1·5 to 2 cm., thinly leathery, glossy, triplinerved; stalks 3 to 5 mm. long. Flowers in much contracted simple or slightly compound racemes, usually the upper flowers ♂ and the lower ♀ or all ♂, rarely all ♀. Male flowers erect, when open, on short stalks, with a pair of bracts of varying size close to the perianth, which consists of two alternate pairs of white tepals as shown in figs. 2 and 3, the tepals 3 to 3·5 mm. long; filaments white, up to 6 mm. long; anthers over 2 mm. long, yellow; rudimentary ovary a minute depressed gland-like body (figs. 3 and 5). Female flowers borne on elongated spreading or nodding stalks, 3 to 5 mm. long, bearing 6 or more imbricate adpressed pale green bracts up to 2 mm. long which usually pass upwards from a spiral into a verticillate arrangement of whorls of three, the uppermost being very like the two whorls of the tepals of the trimerous perianth (see figs. 6 and 9); pistil ovoid-oblong with 3 oblong recurved stigmas. Drupe globose, scarlet or crimson, 8 mm. in diameter; endocarp membranous. Seeds mostly solitary, subglobose, black, glossy, 5 mm. long.

DISTRIBUTION.—Yangtse basin from Ichang westwards to North-west Yunnan and the Tibetan frontier, from a few hundred to 2,400 m. O.S.

Fig. 1, a flowering branch, nat. size; 2, a ♂ flower, $\times 4$; 3, the same with the stamens removed in top-view, showing the rudimentary ovary in the centre, $\times 4$; 4, a stamen, $\times 5$; 5, rudimentary ovary, $\times 5$; 6, a ♀ flower, $\times 5$; 7, a tepal of a ♂ flower, $\times 6$; 8, the same flattened out, $\times 6$; 9, a ♀ flower in top-view, $\times 6$; 10 a pistil, with the front-half of the base cut away so as to show the ovules, $\times 12$; 11, a section through an ovary, $\times 20$; 12, a fruiting branch, nat. size; 13, a fruit, $\times 2$; 14, a seed, $\times 2$; 15, the same in longitudinal section, $\times 2$.

9094



TAB. 9046.

CHELONISTELE PUSILLA.

Malaya.

ORCHIDACEAE. Tribe COELOGYNINAE.

CHELONISTELE, Pfitzer in Engler, *Pflanzenreich*. IV. 50. II. B. 7. 136.

Chelonistele pusilla, Ridley, *Fl. Malay. Pen.* 138 (1924); affinis *C. sulfurcae*, Pfitz. et *C. perakensi*, Ridley (Bot. Mag. t. 8203 sub *Coelogyne*), sed statura minore, pseudobulbis parvis, floribus minoribus fulvescentibus, sepalis atque labio latioribus et ab illa praeterea labii lobis lateralibus longioribus plane distincta. Syn. *Coelogyne pusilla*, Ridley in Journ. Linn. Soc. XXXII. 327 (1896).
C. decipiens, Sander, Orch. Guide 31 (1901).

Chelonistele is a Malayan genus proposed by Pfitzer for a small number of species which so far had generally been referred to *Coelogyne*. It differs from the latter in the clawed lip and the shape and size of the lateral lobes of the lip which owing to the interpolation of a claw stand off widely from the column instead of sheathing it more or less, as the broad lobes of *Coelogyne* do. The specimen from which the present plate has been prepared was, in 1903, purchased by Kew from Messrs. Sander of St. Albans who had enumerated it in their Orchid guide of 1901 as a new species of *Coelogyne*, *C. decipiens*, with the statement that it came from Burma. On my inquiry as to the name of the collector and the exact locality of collecting, I was informed that neither could be traced at present. Mr. Ridley, however, has since recognised the plant as his *C. pusilla*. This was discovered by Mr. F. Curtis on Gunong Hijan, one of the peaks of the Taiping Hills in Perak, in September 1889, and it was described by Ridley from his specimens as *Coelogyne pusilla* in 1894. In 1893 Mr. Ridley himself collected it in the same hills. His water-colour sketch of *C. pusilla* agrees exactly with our plant, so that there can be no doubt as to their identity.

C. pusilla is allied to *C. sulfurea*, but it is a much smaller plant with smaller flowers, broader whitish-

tawny sepals and a comparatively broad lip with narrower linear side lobes and an orange- or cinnamon-coloured square blotch on the middle lobe. *C. perakensis* has a lip more like that of our plant in shape, but otherwise it is as distinct from it as *C. sulfurea*, as can be seen from a comparison with the picture on t. 8203 of this work. *Chelonistele* is as far as we know at present confined to the western half of Malaya (Borneo, Java and the Malay Peninsula) with a slight extension to Lower Burma.

C. pusilla has been kept at Kew for the last twenty years in an intermediate house except when it was making growth and required a higher temperature. A mixture of A1 fibre and sphagnum forms a good compost in which it thrives well, flowering profusely every year during February and March.

DESCRIPTION.—A *cespitose* plant about 10–15 cm. high with numerous *small* one-leaved ovoid-oblong *pseudobulbs* which are hardly over 2 cm. long; cataphylls (about 4) sheathing the flowering stems up to 2 or 3 cm. Leaves, as shown in the figure, varying from 7·5 to 10 cm. in length. Flowering scapes erect or gently curved, appearing with the young leaves, 5–7 cm. long up to the inflorescence; racemes up to 8-flowered, 3–5 cm. long; bracts very early deciduous, up to over 1·5 cm. long, membranous, firmly nerved, whitish; pedicels 5 mm. long. Receptacle very slender, as long as the pedicel and gradually passing into it. Sepals as shown in fig. 2, mostly 10 by 5 mm., their sides often differently coloured, one more tawny than the other. Petals linear, revolute and often more or less spirally twisted, very pale. Lip descending from a boat-shaped rising claw with a broad 2-fid terminal lobe 8–9 mm. by 5–6 mm. and two linear horn-shaped lateral lobes (2–3 mm.) standing off at right angles (see figs 2 and 3) and with two slender crests in the narrow part, the crests and the middle nerve brown, leaving two yellowish-white areas between them with an orange- or cinnamon-coloured almost square blotch in front. Column with a shell-shaped hood as shown in figs. 2 and 4, 8 mm. by 4 mm. or by 5 mm. if flattened out. Anther brownish-

orange, 1.5 mm. wide (see figs. 5 and 6). *Pollinia* as in fig. 7, yellow.

DISTRIBUTION.—Malay Peninsula; Perak, Taiping Hills, 1,200–1,500 m. O.S.

Fig. 1, a flowering plant, nat. size; 2, a flower, $\times 2$; 3 the same in side-view with one of the lateral sepals removed, $\times 2$; 4, column, $\times 4$; 5, anther from above, $\times 7$; 6 the same, from below, $\times 7$; 7, pollinarium, $\times 15$.



TAB. 9047.

CHIRITA LAVANDULACEA.

Indo-Malaya.

GESNERACEAE. Tribe CRYTANDREAE. Subtribe DIDYMOCARPEAE.

CHIRITA, Buch.-Ham. in D. Don; Benth. & Hook. f., Gen. Pl. II. 1022;
Roettlera, subgen. *Chirita*, C. Fritsch in Engl. & Prantl, Nat. Pflanzenf. IV. 3.
B. 148.

Chirita lavandulacea, Stapf (nov. spec.); affinis *C. barbatae*, Sprague (Bot. Mag. t. 8200), sed cymis lateralibus ex axillis ipsis ortis plerumque foliis binis magis minusve reductis suffultis neque e petiolo ortis nudisque facile distincta, caeterum etiam floribus minoribus et corollae tubo inferne angustiore diversa.

Seeds of this plant were received at Kew three years ago from several sources in this country and on the continent under the names of *Chirita Horsfieldii* var. *scabrida*, *Didymocarpus Horsfieldii* and *Roettlera Horsfieldii*, names which are evidently inapplicable. I have not been able to identify it with any species described nor to ascertain its native country. It seems to have been imported in the first place to the Botanic Garden at Herrenhausen, Hanover, whence it found its way to other gardens on the continent (Berlin, Leiden, Zürich, etc.) and in England and Scotland. It is no doubt nearly allied to *C. barbata*, which was described by Mr. T. A. Sprague in the Botanical Magazine (t. 8200) seventeen years ago, likewise from specimens in cultivation and of uncertain origin. It differs from it at the first glance in the axillary not petiole-borne inflorescences. As to *C. Horsfieldii*, this, although somewhat similar in habit, has the cymes supported by a membranous 2-lobed involucre whilst the calyces are rather wide, membranous, broadly and shortly 5-lobed and at length circumscissile; it belongs in fact to an altogether different group, a member of which was figured as *Liebigia speciosa* in the Botanical Magazine (t. 4315). *C. barbata* was compared by Mr. Sprague with *C. hamosa*, another species with petiole-borne cymes, which is widely dispersed through

tropical India. Our plant might be said to be allied to *C. hamosa* through *C. barbata*, but the affinity does not appear to be very close. *C. hamosa* was referred by C. B. Clarke in his monograph of the *Cyrtandreae* to his section *Microchirita*, and there *C. lavandulacea* may also be placed for the present. It has at any rate the narrow deeply divided practically chorisepalous calyx which is characteristic of the group. Apart from *C. hamosa*, which is, as has already been said, Indian, *Microchirita* is a Malayan group. We may therefore expect that *C. lavandulacea* will eventually be found within the Indo-Malayan region. I have mentioned before that our plant is also known in gardens as *Didymocarpus Horsfieldii* and *Roettlera Horsfieldii*. There is no justification for either combination, unless we accept Professor Fritsch's reduction of the genera *Didymocarpus*, *Chirita* and *Trachystigma*, as defined by Clarke, to one genus, for which the earliest name, viz. *Roettlera*,* would have to stand. This reduction does not recommend itself to us as it sweeps types of different aspect and mostly readily recognised in the field and in gardens into a large incongruous whole, held together merely by the technical character of the presence of 2, instead of 4, fertile stamens. Nor do we, by following such a procedure, gain in simplification, as, whatever advantage there may be in the reduction, it is more than balanced by the ensuing complication of the divisions of the genus and the consequent clumsiness of the nomenclature. The method which Professor W. G. Craib has observed in dealing with certain Chinese groups of *Cyrtandreae* (see Not. R. Bot. Gard. Edin. Vol. XI., 1919) promises much better results.

C. lavandulacea is grown at Kew as a stove plant at an intermediate temperature of about 13°–15° C. (55°–60°F.). It is easily raised from cuttings. It flowers very freely throughout the winter and its charming lavender-blue and white flowers ought to make it a very promising addition to any warm green-house, where it will mix particularly well with begonias and similar plants.

* This genus was dedicated by Vahl to the Rev. Dr. Röttler, a native of Strassburg and for many years a member of the Danish Mission in Tranquebar. Vahl spelled the name correctly *Röttlera* (*Roettlera*.)

DESCRIPTION.—An erect branched *herb*, up to 9 dm. high, with more or less succulent sparingly glandular hairy axes; the main stem up to 2.5 cm. in diameter; the lower branches 4–5 dm. long. *Leaves* stalked or (the uppermost) sessile; blades *elliptic to elliptic-oblong or the upper broad-ovate from a rounded or slightly heart-shaped base*, acute at the short tips, the largest up to 20 cm. by 12 cm., decreasing upwards much in size, closely crenulate, bright green, softly hairy; lower leaf-stalks up to 15 cm. long. *Cymes terminal on the main-stem and the branches of the first and second order, usually supported by a pair of much reduced sessile and amplexicaul leaves, or the upper sessile in the axils of the leaves*, few to 11-flowered; pedicels 1–2 cm. long with spreading glandular hairs. *Calyx* up to 6 mm. long, narrow; sepals linear-lanceolate, membranous except the herbaceous recurved tips, slightly imbricate downwards, glandular-hairy. *Corolla, as shown in the picture, up to 3.5 cm. long, 2 cm. across the limb, finely downy; tube pure white outside and in the throat; limb lavender-blue. Fertile anticous stamens ascending so as to bring the anthers close up to the stigma, but not overtopping it; anthers as shown in fig. 4. Ovary downy; style glandular-hairy; stigma 2-lobed, the lobes usually secund, resembling a bifid lip. Capsules terete, 6 cm. long, 2.5 mm. in diameter. Seeds ellipsoid with a teat-like process at each end, 0.5 mm. long.*

DISTRIBUTION.—Indo-Malaya, exact range unknown.
O.S.

Fig. 1, the upper part of a plant, nat. size; 2, corolla opened out with the middle lobe of the lower lip removed (staminodes omitted), nat. size; 3, calyx, $\times 3$; 4, fertile stamens in front and back-view, $\times 6$; 5, one of the lateral staminodes, $\times 10$; 6, cross-section through ovary, $\times 20$; 7, style and stigma, $\times 3$.





TAB. 9048.

TULIPA HUMILIS.

Persia.

LILIACEAE. Tribe TULIPEAE.

TULIPA, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 818; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 62.

Tulipa humilis, *Herb. in Bot. Reg.* XXX. Misc. 30 (1844); affinis *T. Biebersteinianae*, Boem. & Schult. et *T. patenti*, Agardh (*Bot. Mag.* t. 3887 sub *T. tricolor*), sed foliis plerumque quaternis, flore roseo-purpureo vel albo-roseo, tepalis superne minus attenuatis distincta.—Baker in *Journ. Linn. Soc.* XIV. 292 (1874) et in *Gard. Chron.* XX. 233 (1883) partim; Boiss., *Flor. Or.* V. 199 et 757 (1884) excl. syn.; Bornmüller in *Bull. Herb. Boiss.* ser. 2, VIII. 730 (1908) excl. syn.

Syn. *T. Celsiana*, Kotschy in *Mitt. Geogr. Gesellsch. Wien.*, V. 79 (reprint, 14; 1861), non DC. in *Red.*

T. Aucheriana, Baker in *Gard. Chron.* XX. 168 (1883); Boiss., l.c. 757 (1884).

This charming tulip was obtained by Mr. C. G. van Tubergen of Haarlem from his collector A. Kronenburg, who in 1904 worked for him in Salmas, a mountainous district to the west of the northern end of Lake Urumia in Azerbaijan, North-west Persia, and it was distributed by his firm as *Tulipa polychroma*, a species which was described by me in the *Denkschriften* of the Vienna Academy in 1885. Now *Tulipa polychroma* is a small tulip with bulbs whose tunics are densely lined with a very soft tawny or slightly reddish wool, and with flowers which are white and yellow inside and flushed with red outside, opening star-like in bright sunshine. It is obvious that van Tubergen's plant does not agree with this description. On the other hand it tallies well with specimens collected by the Russian explorer Szovitz in 1828 near Diliman, the chief town of the Salmas district, and identified by Boissier in *Flora Orientalis* as *T. humilis*. This species was based by Dean Herbert on plants which he had grown in his garden at Spofforth, near Harrogate, Yorkshire, from bulbs received in 1838 from Theodor Kotschy, who had gathered them above the village of Derwend on the southern slopes of Kuh-i-Tochal in the Elburs north of Teheran. There, but on the north side of the mountain, Herr Joseph Bornmüller also collected it in 1902. It flowered, he says, in great profusion, varying in all shades from a deep rose-purple

to white, with just a flush of pink. Curiously enough Bornmüller, too, distributed the plant originally as *T. polychroma*, but recognizing its identity with *T. humilis* he enumerated it eventually under that name in the account he gave of his collectings in North Persia in 1908, though retaining the name *T. polychroma* as a synonym of *T. humilis*. Dean Herbert's plants seem soon to have been lost. The species was, however, eventually reintroduced from Teheran by Mr. Elwes in 1880, and it was distributed by him to Kew and other gardens in England. J. G. Baker, unaware of the identity of Elwes's and Kotschy's plant, identified it with specimens collected in 1838 (no. 5372)* by Aucher-Eloy on Kuh-i-Dalan (N.W. of Ispahan and S. of Khonsar) on the borders of the Bakhtiary country, and taking it to be a new species he described it as *T. Aucheriana* in 1883. The naming of the plant and the problem of its distribution were, however, further complicated by the inclusion by J. G. Baker of *T. Buhseana* and *T. crispatula* as synonyms of *T. humilis*. Now while the identity of *T. humilis* and *T. Aucheriana*, which was in fact already suggested by Boissier, is undoubted, none of the other assumed synonyms can in my opinion be accepted as

* The locality for Aucher-Eloy no. 5372 is given as "Ispahan" at Kew as well as at Paris, as Professor Lecomte informs me, but it is evident that the tulip must have been collected on Kuh-i-Dalan on July 8, 1838. This inference is based on the following facts. Aucher's specimens reached Europe in two consignments. The first comprised the collections made up to 1836 and these were numbered by Jaubert up to 3870. The second covered the collections of 1837 and 1838, the numbering being done in this instance at the Museum d'Histoire Naturelle of Paris and starting from 4000. Now Aucher-Eloy was in Ispahan in 1835 and again in 1838. His number 5372 was therefore collected in 1838. In that year he stayed at Ispahan twice, first from December 31, 1837, to January 4, 1838, when on his way from Teheran to the Persian Gulf, and then again after his return from the Gulf on June 24. He was then already very ill and exhausted; but having recovered to some extent he started on July 5 for the Bakhtiary country in the hope of completing his recovery in the pure air of the mountains. However he did not get farther than Kuh-i-Dalan, which he ascended on July 8, collecting as he says in his diary a number of fine umbellifers (*Cachrys prangoides*, *Ferula macrocolea*, etc.). The next day the lawless state of the country obliged him to return to Ispahan, where he died on October 6 without having left the walls of the hospitable convent of Djulfa. This excursion to Kuh-i-Dalan was the only occasion when he could so late in the year have come across flowering tulips and that only at a high altitude. He speaks indeed of there having been still some snow on the top of the mountain, which would naturally delay the tulips and the umbellifers, a combination by the way that is very common throughout those mountains and adds so much to the fleeting charm of their spring-vegetation. I have already named two of the umbellifers which he obtained on what was to be his last collecting day—these and a few more are located on the labels as collected on Kuh-i-Dalan or, as he has it, "Delin-Kou"—to these I may now add *T. cuspidata* and *T. chrysantha*, both labelled "Ispahan" and numbered 5374 and 5373 respectively.

such. I have already referred to the differentiating characters of *T. polychroma*, but I would add that I have seen this tulip not only in cultivation (plants raised from bulbs collected by Dr. Polak near Hamadan, the original locality) but also in its thousands in the mountains to the south and south-west of Shiras, and I have found it so uniform that I was never tempted to distinguish "varieties" or to suspect transitions to any other species known to me. As to *T. Buhseana*, a native of the mountains of Yezd in Central Persia, this was described by its author as having woolly tunics and yellow flowers flushed with red on the outside. There is then only *T. crispatula* left to account for. This plant has, so we are told, sparingly woolly tunics, two or three very long wavy ciliate leaves and pale rose flowers with narrow tepals (20–22 mm. by 6 mm.). It is another of Buhse's discoveries, its home being the north-western edge of the great North Persian desert.

The area of *T. humilis* is therefore confined to the West Persian mountain ranges from 38° to 32° N., where Kellar Kuh at the headwaters of the Karun River marks so far the southern limit,* and to a section of the Elburs Range. No precise data are available of its vertical distribution in North-west and West Persia, but the dates at which the tulip was found in flower in the mountains of the Bakhtiaries suggest high altitudes, probably of 3,000 m. and upwards. In the Elburs, on the other hand, we have Kotschy's and Bornmuller's estimates according to which the vertical range of *T. humilis* is from 1,500 to 3,000 m.

Our plate was prepared in the early spring of 1924 from specimens grown in the Royal Horticultural Society's Garden at Wisley from bulbs obtained from Mr. Van Tubergen of Haarlem in the autumn of 1923. Similar plants, but with a considerable range of colour variation, were raised from the same source at Kew. In both cases the bulbs were planted in pans and wintered in the frame, which, no doubt, accounts for their early flowering. In the home of the plant flowering does not take place before the beginning of May or June or even as late as July. Under natural conditions the bulbs

* The celebrated traveller and archaeologist W. K. Loftus collected it here on June 2, 1852.

are buried under snow for four or five months and even longer, and they pass through another resting period from the time when the leaves have drawn in to the advent of the winter. During this period they are, in the Persian climate, not only sure of being kept dry, but they are also exposed, even at high altitudes, to high ground-temperatures. The bulbs require therefore, as Mr. van Tubergen writes, "a warm place in the garden where they can get a good roasting in the summer. Failing that the bulbs have to be taken up after the foliage has dried down and kept in a warm place until planting time in early November."

DESCRIPTION.—*Bulbs* broadly ovoid, 2–2.5 cm. high and broad; tunics brown, *sparingly adpressedly hairy inside towards the tips*. *Stem* from a few to over 20 cm. high. *Leaves* mostly 4, approximately at or just below the middle of the stem, linear, obliquely erect or curved, concave, shortly tapering upwards to a blunt or slightly pointed tip, 7–15 cm. by 5–8 mm., dark green or, on the face, slightly glaucous. *Flowers* solitary, nodding or when fully open more or less erect and widely open, rather variable in size. *Outer tepals* lanceolate, acute, 2–5.5 cm. by 5–12 mm., colour as shown in the picture or very much paler to almost white with a blush of pink, more rarely bluish-lilac or verging toward violet, but the base always of a rich golden-yellow for 5–15 mm. upward. *Inner tepals* obovate to oblanceolate, acute, as long as the outer, but up to 2 cm. wide above the middle, ciliolate at the base, colour as in the picture or varying in conformity with the outer tepals; both series of tepals minutely villosulous at the tips. *Filaments* 6–12 mm. long, yellow with white hairs at the base; anthers 4–5 mm. long. *Ovary* as in the figure.

DISTRIBUTION. North Persia; Elburs near Teheran, from 1,500 to 3,000 m. North-west and West Persian mountain ranges from 38°–32° N., probably up to 3,500 m. O.S.

Figs. 1 and 2, flowering stems (2 only with the uppermost leaf), nat. size; 3, an inner tepal, nat. size; 4, an outer tepal, nat. size; 5, a stamen, $\times 2$; 6, an ovary, $\times 2$; 7, stigma, $\times 4$; 8, section through an ovary, $\times 6$; 9, a bulb with the tunics partly removed, nat. size; 10, a part of a tunic seen from within, showing the characteristic hairy covering at the tip.



TAB. 9049.

CUPRESSUS DUCLOUXIANA.

China.

PINACEAE. Tribe CUPRESSINEAE.

CUPRESSUS, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 427; *Eichl. in Engl. & Prantl, Nat. Pflanzenf.* II. 1. 99; *Engl. in Engl. & Prantl, l. c. Nachtr.* 25.

Cupressus Duclouxiana, *Hickel in Camus, Cyprès*, 91 t. iii. (1914): arete affinis *C. sempervirens*, Linn., sed ramis descenduntibus nisi apice sursum curvatis, ramulis gracilioribus, foliis utrinque magis acutis, conis maturis minoribus, squamis paucioribus (4--8), seminibus ad angulos angustissime marginatis saepe subtriquetris distincta.

Syn. *Cupressus sempervirens*, Franch. in *Journ. de Bot.* XIII. 263 (1899); Hemsley in *Journ. Linn. Soc.*, 541. XXVI. (1902), non Linn.

As long ago as 1793 the Portuguese botanist Juan Loureiro stated in his *Flora Cochinchinensis* that the common cypress of the Mediterranean countries (*Cupressus sempervirens*) was planted in Cochinchina and that it was brought there from China. There was, however, no evidence of that cypress occurring in China either in the wild state or in cultivation. Still, Loureiro's record remained undisputed, but, we may add, also unconfirmed.* By the end of the last century, however, it seemed as if Loureiro's statement might after all have had some foundation, for in 1899 Franchet identified certain specimens of a cypress which the French missionary Armand Delavay had collected in the eighties in temple-grounds in western Yunnan as *C. sempervirens*. Franchet's record passed subsequently into the "Index Florae Sinensis" (1902) with a selection of synonyms which would seem to imply that it was the spontaneous form, the *C. horizontalis* of the earlier writers. There the matter rested until in 1914 Mr. E. H. Wilson, arguing from the improbability of the occurrence of *C. sempervirens* in China and from his knowledge of the Chinese

* Loureiro's description of the tree leaves little doubt that it was the weeping cypress of China (*C. funebris*), which, according to A. Chevalier, ranges through East Yunnan southwards to Tonkin, where it grows wild on limestone hills (*Bull. Econ. de l'Indochine* XX. 879; 1918).

cypresses, suggested that Delavay's cypress, which he knew only from Franchet's record, might be *C. torulosa*. Simultaneously, however, Mr. R. Hickel, General Secretary of the Dendrological Society of France, had come to the conclusion that the plant in question was a new species, distinct from *C. sempervirens*, but certainly closely related to it, and he gave a very complete account of it in M. Camus's monograph of the cypresses. This account was based not only on the examination of the specimens collected by Delavay and of others obtained subsequently from Msg., afterwards Bishop, Fr. Ducloux, after whom he named the species, but also on the study of living plants which had been raised by M. Léon Chenault in his Arboretum at Orleans, the plant having originally been introduced by M. Maurice Vilmorin about 1905 from Yunnan. Some of these plants subsequently reached this country, and from one of them, a young tree in the Marquis of Headfort's collection at Kells, Co. Meath, Ireland, which coned, though rather imperfectly, for the first time in 1923, the present plate was prepared with the exception of the figures of the mature cone and the seeds which were drawn from a dried specimen collected by Forrest in the Teng yueh valley (no. 8166).

The exact locality where Delavay discovered our species is Mo-so-yn, about 15 km. N. of Lake Tali, where, according to him, it grows "subspontaneously." It was next, about twenty years later, collected by Msg. Fr. Ducloux, at Yunnan-fu, the capital of Yunnan. Then in 1910 Forrest obtained it on the eastern flank of the mountains on the west side of the lake, also growing around temples. Two years later the same explorer met with it in the valleys of Teng yueh and Kan ngai in the south-west corner of Yunnan where, so he says, it is "generally cultivated around temples" or occurs in a "semi-cultivated" state. More recently Camillo Schneider collected it in temple-groves near Yunnan-fu, and it may be that the "dark, tall" cypresses which Sir Alexander Hosie saw (1911) on the borders of the irrigation-canals in the plain of Yunnan-fu and which struck him as different from the wild cypress of the forests

(*C. funebris*) was also our species. On the other hand, Professor Augustine Henry tells me that he never saw *C. Duclouxiana* in the parts of southern Yunnan which he visited nor in any other part of China. Whilst it is thus evident that *C. Duclouxiana* has not yet been observed in the wild state, it is, at the same time, probable that its natural home is not far from the area of its plantation, and as it is hardy in the west of England, in Ireland and in Normandy and has even stood the winters of Orleans,* we may expect it to occur wild at higher elevations in the forests of northern Burma or the adjoining borderland of Yunnan.

None of the collectors has so far described the habit of this cypress, but a photograph taken by Herr C. Schneider at Yunnan-fu, shows a well grown tree with a straight upright trunk and a dense, blunt, almost cylindrical crown, about four times as high as broad, whose branches descend steeply and then curve upwards at their tips. On the other hand a portrait of a specimen about five years old and 3 m. high in Chenault's Arboretum represents a conical bush with upright branches after the manner of a young Mediterranean cypress, whilst one which is now twenty years old has according to M. Chenault attained a height of 6 m., its shape being still perfectly conical. The Marquis of Headfort's plant has a similar shape with a height of 4 m. and a diameter of 1.4 m. at 1.2 m. above the ground. I have already referred to the close affinity of the Yunnan cypress with *C. sempervirens*. Apart from the habit which has been described above, the differences are mainly in the slenderer branchlets of the former, their more acute scale-leaves and the smaller cones with their smaller, hardly winged and often triquetrous seeds. As the easternmost stations of *C. sempervirens* (in the wild state) are in the western Elburs and the Lebanon, the areas of the two species are indeed very widely separated; but if we remember that the other close ally of *C. sempervirens* is the Californian *C. macrocarpa*, we have to admit

* M. Chenault informs me that adult specimens resisted at Orleans even the exceptionally severe winter of 1917 with a minimum temperature of -18° C. (0° F.) without injury. It was only young plants which suffered to some extent.

that the distance of their areas can hardly enter into any argument as to the degree of relationship.

DESCRIPTION. A tree from 9 to over 20 m. high; trunk straight, erect; crown of mature trees dense, almost columnar with the branches steeply descending, but curved upwards at their tips. *Leaves* of the juvenile state (according to Hickel) scale-like, oblong, pointed, 2 mm. long, appressed to the axis except for the tips; of the adult (cone-bearing) state:—those of the long shoots 4–6 mm. distant, ovate, acute and almost pungent, more or less spreading, 1.5–2 mm. long, long decurrent; those of the short-shoots, which are tetragonal or almost cylindric and up to 1.5 cm. long, with a diameter of 0.5–0.75 mm., 4-ranked, rhombic, acute at both ends or the uppermost of a twig slightly blunt, appressed all along, adnate from the middle downward, 1.5–2.5 mm. by 0.5–0.75 mm. with a shallow linear resin-gland on the back. Male cones ovoid or oblong-ellipsoid, 4 mm. by 2–3 mm. with up to 6 decussate pairs of scales (see fig. 3); pollen-sacs 2 or more commonly 4 (see figs. 4–7). *Female cones* almost as copious as the male, formed usually of 2–3 decussate pairs of scales which spread star-like at the time of pollination, about 8 mm. in diameter; scales as shown in figs. 8–10, fusing early except the recurved stout horn-shaped tips; all scales fertile with numerous ovules. *Mature cones* globose, 2–3 cm. in diameter, dark brown with a bluish bloom or at length blackish-brown; scales 4–6 stout, the lowest pair or the lowest two pairs fused at the base, the others free from each other, more or less roundish-pentagonal or the uppermost square, slightly depressed in the centre, with or without short pointed umbos. *Seeds* as shown in figs. 11 and 12, convex on both sides or triquetrous, obscurely winged, 4–4.5 mm. long, reddish to deep chestnut-brown. *Cotyledons* 2.

DISTRIBUTION. Central and West Yunnan, cultivated.
O.S.

Fig. 1, a branch flowering, nat. size; 2, the tip of a branchlet, $\times 6$; 3, a branchlet bearing a male cone, $\times 6$; 4–7, scales of a male cone with pollen-sacs, $\times 12$; 8, a young female cone in side view at the time of pollination, $\times 5$; 9, the same seen from the top, $\times 5$; 10, a section through a young female cone, $\times 5$; 11, a mature cone, nat. size; 12, a seed in front- and back-view, $\times 6$.

TAB. 9050.

CALLISTEMON CITRINUS VAR. SPLENDENS.

Australia.

MYRTACEAE. Tribe LEPTOSPERMEAE.

CALLISTEMON, R. Br. ; *Benth. & Hook. f., Gen. Plant.* I. 704 ; *Niedenzu in Engl. & Prantl, Nat. Pflanzenf.* III. 7. 93.

Callistemon citrinus, *Stapf* (comb. nov.) var. **splendens**, *Stapf* (var. nov.) a forma primo descripta floribus maioribus et praecipue filamentis longissimis distinctus.

Syn. *Callistemon laevis*, Kew Hand-list, Tend. Dicot. 117 (nomen ; 1900), non Ferd. v. Muell. (MS. in herb. Kew. ; vide infra).

Many years ago Kew received from Australia—the exact source cannot be traced now—seed of a *Callistemon* under the name of *C. laevis*, Ferd. v. Muell. A plant raised from that seed has long been an object of admiration in the Conservatory owing to the brilliancy of its flowers and the length of its flowering. It appears, however, that Ferdinand v. Mueller never published the name *C. laevis* nor even meant to apply it to this plant as there is in the Kew Herbarium a specimen written up by himself “*Callistemon (rugulosus ?) laevis*, Burdekin River” which is quite different from the plant grown at Kew as *C. laevis* and figured here as *C. citrinus* var. *splendens*. I have substituted the latter name because after a revision of the material of *Callistemon* in the Kew Herbarium I have come to the conclusion that the Kew plant represents only an exceptionally large-flowered race of *C. citrinus*, a species proposed and figured by W. Curtis in the Botanical Magazine (t. 260) as *Metrosideros citrinus* as long ago as 1794 and subsequently named *C. lanceolatus*, by which name it is more generally known. It is true that Curtis’s figure hardly suggests specific identity with our plant, but the history of the introduction of *C. citrinus* and its behaviour in the gardens of the period, where it seems to have been by no means rare,

leaves no doubt that the model of Curtis's plate was merely a badly developed example of the species. P. A. De Candolle remarked already in 1821: "Flores in icone Curt. axillares et sparsi pinguntur, sed saepius confertospicati et continui ut in aliis." The common or typical state of *C. citrinus* is well represented in Ventenat's picture in "Jardin de Cels" t. 69 (1800) under the name *Metrosideros lophanthus*, in Loddiges's "Botanical Cabinet" tt. 523 (1821) and 1288 (1827) under the names *Metrosideros semperflorens* and *Callistemon scabrum* (sic) respectively, and more recently in Maiden's "Flowering Plants . . . of New South Wales," part II. t. 8 (1895) under the designation *Callistemon lanceolatus*. In this state, which is widely diffused throughout south-eastern and eastern Australia from Gippsland in Victoria to southern Queensland, the length of the filaments fluctuates mostly between 15 and 20 mm., whilst 12-15 mm. and 20-25 mm. are exceptional figures. On the other hand in the form here described the limits are 30-35 mm., which means an addition of 15 to 20 mm. to the diameter of the spike of the typical condition, and on this the greater beauty of our plant rests. Curtis gave the species the name *citrinus* in allusion to the aromatic scent which the leaves emit on being crushed and which reminded him of that of the leaves of the lemon-tree. The name was chosen perfectly legitimately and there was no reason to change it into *lanceolatus* as J. Smith did two or three years later.

The genus *Callistemon* which in 1814 was proposed by Robert Brown "for those species of *Metrosideros* that have inflorescences similar to that of *Melaleuca* and distinct elongated filaments" comprises, as known at present, about 20 species, all Australian and mostly confined to south-east and extra-tropical East Australia. Two species only are recorded from West Australia and a few occur in tropical Queensland as far north as the Cape York Peninsula, whilst the range of one species extends across Bass Strait to Tasmania. The species are often difficult to discriminate, but a key to them accompanied by a partial revision of the genus by Cheel and Maiden in Maiden's *Illustrations of New South Wales Plants* (part III. ; 1911) has greatly facilitated the identifica-

tion of these often very ornamental plants which, I may add, are easy to grow in the green-house and require no special treatment beyond that generally given to Australian *Myrtaceae* and acacias. The specimen from which our plate was prepared is planted out in the ground in the Conservatory and is about 4 m. high; other specimens are grown as pot-plants from cuttings. Treated thus they flower early and when still comparatively small. There is no reason why our plant, probably the best strain of the "Red Bottle-brush" as it is called in Australia, should not be found hardy in the open in the south-west of England and in many places in Ireland. At Kew it rarely ripens its fruits, possibly owing to the absence of facilities for cross-fertilisation. I have found no observations in literature on the mode of pollination in *Callistemon*, but I would refer to a note accompanying a specimen of *C. paludosus* in the Kew Herbarium according to which the spikes of this species have been seen being visited by thousands of moths.

DESCRIPTION.—A loosely branched *shrub* up to 5 m. high; the young shoots densely and softly hairy above the inflorescence, soon glabrescent below it, or the hairs sometimes persistent for some time; the bark bright chestnut-brown. *Leaf-buds* cylindrical, acute, 15–25 mm. by 2·5–3 mm.; perules rapidly increasing in length from the base upwards, the lowest ovate, the uppermost very narrow, 20 mm. long, all acute, finely downy, brown to straw-coloured. *Leaves* silky and silvery tomentose when young, very soon glabrescent and finally quite glabrous, oblanceolate to linear-lanceolate, mostly long tapering to the base, acute and almost pungent, 5–8·5 cm. by 7–15 mm., rigid, slightly glaucous or dull green, dotted with oil-glands which like the sharply defined submarginal nerves and the numerous lateral nerves become more distinct and raised as the leaves dry; leaf-stalks broad and somewhat flat, 2–3 mm. long. *Spikes* cylindrical, very dense, 9–10 cm. by 6–7·5 cm.; bracts very early deciduous, as shown in fig. 3. *Receptacle* cylindric-ovoid, 3–4 mm. by 3·5 mm., green, whitish-pubescent. *Sepals* semi-orbicular, slightly reddish,

silky on both sides, 1·5 mm. long. *Petals* very deciduous, broadly elliptic, 4–5 mm. by 3·5 mm., greenish, silky outside. *Stamens* quite free, about 50–60 in two whorls; *filaments* 30–35 mm. long, *brilliantly crimson*; anthers purplish-black with golden-yellow pollen, otherwise as shown in fig. 5. *Ovary-crown* silky-tomentose; style and stigma as in fig. 4. *Fruit* long persistent on the old wood, globose, 7–9 mm. in diameter, with a stout rim.

O.S.

Fig. 1, an inflorescence, nat. size; 2, some of the lowest perules of a leaf-bud, nat. size; 3, bracts, nat. size; 4, longitudinal section of a flower, $\times 3$; 5, anthers, $\times 10$; 6, fruits, nat. size; 7, transverse section of a fruit, $\times 3$.



TAB. 9051.

RHODODENDRON LYI.

China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron Lyi, *Léveillé, Flore du Kouy Tchéou* 153 (1915) et in *Fedde, Rep.* XIII. 147 (1915); arete affinis *R. ciliicalyci*, Franch., sed foliorum squamulis magis approximatis, floribus minoribus, calyce admodum reducto et eius lobis plerumque eciliatis distinctum.—*Hutchinson in Not. Bot. Gard. Edinb.* XII. 56. fig. 7 (1919) et in *Millais, Rhododendrons*, ed. II. 179 (1924).

Although as large as Great Britain south of the Clyde and abutting on countries of an extraordinary floral wealth, the province of Kweichou, the home of the plant figured here, was until recently almost a *terra incognita* to botanists. When in 1904 the "Index Florae Sinensis" was completed, it contained barely a score of species that had been recorded from Kweichou. The next year Miss M. Smith's "Supplementary List" to the "Index" raised their number to 140. These additions were the first fruits of an enterprise which had just begun and, in its continuation, introduced us gradually to the flora of the province, culminating within a dozen years in a "Flore du Kouy Tchéou," that recorded nearly 3,000 species. As in Szechuan and in Yunnan, so here, French missionaries were the pioneers of botanical exploration, first Father S. Bodinière, Apostolic Vicar of Kweichou, then the Fathers Julien Cavalerie and Joseph Esquirol, assisted by a few native collectors, among them Jean Ly, after whom our plant is named. They were guided and encouraged by Msg. Hector Léveillé of Le Mans, who, partly with the help of other botanists, worked out their collections and recorded their discoveries and finally condensed the results of their work in the "Flore du Kouy Tchéou" which I have mentioned above. Space forbids me to enter into the history of this in some ways singular publication, which was issued in

only fifteen autotyped copies of over 500 pages, stencilled, engraved and printed by the author's own hands in a time of greatest stress (1914-1915) within three months, a monument to the unselfish zeal of the missionaries, as L  veill   intended it to be, but also, with all its faults, a monument to the passionate devotion and the stupendous industry of the author.

Although L  veill  's book gives us some idea of the floristic composition of the vegetation of the southern part of Kweichou where the collections were mostly made, we have so far only glimpses of its ecology, so that it is very difficult to visualize the conditions under which our plant grows. *R. Lyi* was discovered in 1912 by Cavalerie at "Gan Chouen," the Anshun of most atlases, 70 to 80 km. S.W. of Kweiyang the capital. This is how Calvalerie describes the district: "Gan-Chouen is a dry limestone plateau over which are dotted rocky hills, abounding in deep hollows, grottos and caverns; there live hidden away some rare ferns and various forms of *Sedum*. Otherwise the flora is poor." This does not suggest the presence of many rhododendrons; yet L  veill   enumerates no less than 16 species, all it seems collected in the south within a comparatively small area. For the explanation of this apparent contradiction we have to turn to Sir Alexander Hosie's book "On the Trail of Opium" (1912) and his account of the vegetation of the limestone tract in question, which he crossed somewhat farther west in the spring of 1911. He describes the country, "the Switzerland of China," as he calls it, as much broken ground with banks and cliffs and towering crags of limestone, with conical peaks or rounded knolls, with valley after valley, now grass- and scrub-covered and treeless, then again densely wooded, mostly with oak and a dense undergrowth of rhododendrons and other shrubs. In one place he speaks of a certain part not far from the Yunnan-frontier as "a country which would have been desolate had it not been for the masses of scarlet rhododendrons that shone out from among other shrubs and scrub," and on another page he says "Nowhere have I seen a more magnificent show of flowers than the blossoms of the scarlet and lavender-coloured rhododendrons on the high slopes." Once

he turned from a "level ridge clad with grass and shrubs . . . through a low range, one mass of scarlet rhododendrons", or the road "winds . . . among hills, covered with grass, scrub or bracken. The hollows between the hills were tangled masses of trees and undergrowth, including some fine rhododendrons with magnificent white blossoms." The last locality was near the hamlet of Hou-tsao, the Ou-chau of Cavalerie and the "locus classicus" of *R. liliiflorum*, the sister-species of *R. Lyi*, and we may assume that the latter too finds similarly favoured stations in the "dry" (*séché*) plateau of Anshun. Other rhododendrons were found farther east, but still within the limestone area, at Ping-fa ($26^{\circ} 3' \text{ N.}$, $107^{\circ} 8' \text{ E.}$) the French mission-station so often mentioned by L  veill  . The occurrence of so many rhododendrons on limestone and occasionally in great profusion is worth our attention. The limestone is said to be triassic. The peaks rise here rarely much over 2,000 m., yet the climate of the plateau is temperate, except in the deeply cut valleys where it is sub-tropical. Kweichou has the reputation of being one of the deforested provinces of China, but Hosie remarks that the hills bear still "ample testimony to the existence in days gone by of gigantic forests, especially oak, whose scrub springs to-day in dense masses from the old roots."

I have already referred to the differences between *R. Lyi* and *R. ciliicalyx* in the Latin diagnosis, but I may repeat here that, on the side of *R. Lyi*, they consist mainly in the presence of bristles on the young branches, the much closer scurf of the leaves and the practical absence of long cili   on the small calyx-lobes. The characters which separate *R. Lyi* from *R. liliiflorum* are more obvious, the latter having larger flowers (9 cm. long) with thin enlarged calyces (1 cm. long) and enclosed styles. Both species belong to the *Maddenii*-series which reaches here its easternmost extension.

R. Lyi was introduced by Vilmorin, Andrieux & Cie. (no. 7710). The particular plant from which our plate was prepared was kindly communicated to us by Mr. E. J. P. Magor of Lamellan, who writes that it has stood the winters so far quite well, flowering generally toward the end of May. The white of the flowers is particularly

pure, though somewhat cold owing to the absence of anthocyanine from the corolla, while the lemon-coloured and green-spotted blotch in the throat and the tinge of green on the outside enhance the chilling effect of the pure white.

DESCRIPTION.—A *shrub* up to 2 m. high, the young branches sparingly scurfy, *bearing soft spreading bristles in the upper part*. Leaves 5 to 8, crowded upwards on the branches; blades borne on stout scurfy, more or less bristly stalks, 2 to 8 mm. long; varying from lanceolate to elliptic-oblong, wedge-shaped to slightly rounded at the base, acute or acuminate at the tips, 7 to 10 cm. by 2·5 to 4 cm., firmly leathery, slightly glossy and slightly reticulate on the face, scurfy and at the same time densely white-papillose on the back, *the scurf-scales varying much in size, about 6 or 7 to 1 sq. mm.*, well immersed, rusty-brown, midrib finely impressed above, stout and prominent below. *Flowers* in umbel-like clusters of up to 5; stalks scurfy, 5 to 10 mm. long. *Calyx* 2 to 3 mm. long, *equally or unequally 5-lobed, densely scurfy; lobes rounded, usually without ciliae*. *Corolla* white, with a pale lemon-coloured often spotted blotch on the back of the throat, scented, 4·5 to 5 cm. long, funnel-shaped with a spreading limb, up to 6 cm. across, downy outside below the middle and, although more sparingly, inside near the base; lobes 5, obovate-rotundate with wavy margins, up to 2·5 cm. broad, very sparingly glandular on the back. *Stamens* 10, filaments unequal 3 to 4 cm. long, hairy below the middle; anthers 4 mm. long. *Ovary* as shown in fig. 6, 6-celled; *style long exserted*, scurfy in the lower two-thirds; stigma as in fig. 7. *Capsule* oblong, 2·5 cm. long, constricted at both ends, surrounded at the base by the persistent calyx.

DISTRIBUTION. Kweichou; limestone plateau of Anshun, probably under 2,000 m. O.S.

Fig. 1, a flowering branch, nat. size; 2, a leaf, in back-view, nat. size; 3, a flower in side view, nat. size; 4, part of the base of the corolla seen from within, $\times 2$; 5, stamen cut in two parts, $\times 4$; 6, ovary, $\times 3$; 7, stigma, $\times 3$.



TAB. 9052.

ARONIA MELANOCARPA.

North America.

POMACEAE. Tribe SORBEAE.

ARONIA, *Medik.*, *Phil. Bot.* 140; *Kochne*, *Gatt. Pom. in Progr. Falk-Realgym.* 22. *Pyrus subg. Adenorrhachia*, *A. P. DC. Prod.* II. 651; *Pirus subg. Aronia*, *Focke in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 25. *Amelanchier*, *Benth. & Hook. f., Gen. Plant.* I. 628 *pro parte*. *Sorbus sect. Aronia*, *C. Schneid., Handb. Laubholz.* I. 698.

Aronia melanocarpa, *Ell., Sketch Bot. S. Carol. & Georgia* I. 557 (1821); a caeteris speciebus generis foliis ab initio glabris vel saepius in gemma subtus albo-tomentosis deinde citissime glabratis et fructibus nigris maiusculis cito deciduis distincta.—*Spach, Hist. Nat. Veg.* II. 90 (1834); *C. Schneid., Handb. Laubholz.* II. 997 (1912); *Britton & Brown, Ill. Fl. Unit. Stat. ed. 2.* II. 291 (1913); *Rehder in Bailey, Stand. Cycl. Hort.* i. 396 (1914).

Syn. A. arbutifolia, *Pers, Syn.* II. 39 (1807) *pro parte*.

A. glabrescens, *Spach, Hist. Nat. Veg.* II. 89 (1834).

A. nigra, *Koehne, Dendr.* 254 (1893); *Britton in Mem. Torr. Club.* V. 182 (1894).

Hahnia arbutifolia var. *nigra*, *Medik., Gesch. Bot.* 82 (1793).

Mespilus arbutifolia var. *nigra*, *Willd., Spec. Plant.* II. 1013 (1800).

M. arbutifolia var. *melanocarpa* *Michx., Fl. Bor. Am.* I. 292 (1803).

Pyrus melanocarpa, *Willd., Enum.* 525 (1809); *Lindl. in Trans. Hort. Soc.* VII. 231 (1828); *Aschers. & Graebn., Syn. Mitteleurop. Fl.* VI. ii. 108 (1906). *Bean, Trees and Shrubs ed. 3,* II. 287 (1921).

P. pubens, *Lindl., l.c.* 232 (1828).

P. grandifolia, *Lindl., l.c.* 233 (1828).

P. nigra, *Sarg., Gard. & For.* III. 416 (1890) et in *Bot. Reg.* t. 1154 (1828).

Sorbus melanocarpa, *Heynh., Nom. Bot.* i. 773 (1840); *C. Schneid., l.c.* I. 699 (1906); *Rehder in Bailey, Cycl. Am. Hort.* IV. 1689 (1902); *Hedlund in K. Sv. Vet. Akad. Handl.* XXXV. 117 (1901).

The small *shrub* which is figured in this place is widely distributed through eastern North America from Nova Scotia and the Great Lakes southwards to northern Florida, attaining its most western extension in the northern parts of Minnesota. It occurs mostly in low woods and swamps, but it is by no means excluded from drier situations. It is known in America as Chokeberry, a name which is, however, also applied to its red-fruited congener, *A. arbutifolia*, and refers to the slightly astringent taste of its otherwise pleasant juicy fruits.

Both choke-berries have long been known in gardens, here and on the Continent, and *A. melanocarpa* has occasionally become established as an escape in various places in North Germany. They seem to have been introduced about or before the middle of the eighteenth century, as there are specimens of them in the Banksian Herbarium at the British Museum from Peter Collinson's garden at Mill Hill, Hendon, Middlesex, and from Dr. Fothergill's garden at Upton, Stratford, Essex. They were still fairly commonly grown in the twenties of the last century in a number of forms. It was from this cultivated stock that Dr. Lindley described no less than six species and three varieties. As there are only two or may be three species known in the wild state—they are all natives of eastern north America—the question arises of the relation of Lindley's garden species to the species observable in the field. The wild species are *A. arbutifolia* (leaves persistently tomentose on the back, receptacles and calyces tomentose, fruits ovoid to globose, small, red, long, persistent on the branches), *A. melanocarpa* (leaves rarely already glabrous in the bud, mostly more or less hairy at first, but becoming sooner or later glabrous on the back, fruits globose, large, black, early deciduous) and *A. atropurpurea* (intermediate between the two and almost certainly a natural hybrid between them). These species inhabit a common area and are often growing side by side. They are very variable in habit, size, foliage, and *A. melanocarpa* in the amount of hairiness of the young parts and the rate at which they lose their tomentum. From a study of Lindley's originals, I have come to the following conclusions: 1. *Pyrus** *arbutifolia*, with vars. *intermedia* and *serotina*—*Aronia arbutifolia*. 2. *P. floribunda*=*A. atropurpurea*. 3. *P. depressa*=*A. arbutifolia*. 4. (a) *P. melanocarpa*=*A. melanocarpa*, (b) *P. melanocarpa* var. *subpubescens*=*A. melanocarpa*. 5. *P. pubens*=*A. melanocarpa*. 6. *P. grandifolia*=*A. melanocarpa*. *P. floribunda* is evidently the same plant as was known in gardens long before as *Mespilus pumila* which Professor Ign. Tausch of Prague (1838) says was sent by John Bartram to the "Hortus Leibnitzianus." There is a specimen of it written up "*Mespilus pumila*"

* Lindley treats *Aronia* as part of *Pyrus*.

in Forster's Herbarium at Kew and another (without a name) from Bartram in the Banksian Herbarium. As Collinson who was in intimate communication with Bartram had it too, all the "*pumila*" specimens are probably in the last instance traceable to Bartram. Lindley gave a figure of a flowering branch of his *P. grandifolia* in t. 1154 of the Botanical Register. To judge from Lindley's specimens in his own herbarium at Cambridge, and in that at Kew, the figure exaggerates the size of the leaves and of the flowers very much. The leaves of the dried specimens are not unlike those of our plate and the flowers are certainly not larger. Lindley also figured a flowering branch of *P. floribunda* in the Botanical Register (t. 1006). This too was slightly "improved" by the artist, but it as well as the corresponding herbarium specimen tallies with a piece of *A. atropurpurea* from the New York Botanic Gardens in the Kew collection. If my identification of *A. atropurpurea* with *P. floribunda* and *Mespilus pumila* is correct, the name *Aronia atropurpurea* will have to give way to *A. floribunda*, "*pumila*" being out of the question, as previous to 1838 it existed only as a *nomen nudum*.

A. melanocarpa is perfectly hardy and easy to grow and propagate either from seed or from cuttings or by division—it forms long suckers from the base. The cheerful green foliage as well as the copious pretty flowers and in the autumn the glossy fruits, disposed among the red and brown leaves and not unlike black wild cherries, make the shrub quite attractive, the only drawback being the early fall of the fruit once it is mature.

We are indebted for the material from which the present plate was prepared to the Marquis of Headfort who informs us that he bought the plant from Messrs. Veitch in Exeter in 1917. It is planted in a very exposed position in his garden at Kells, Co. Meath, Ireland, where it thrives to perfection, and forms a tufted shrub at present about 1 m. high.

DESCRIPTION.—A small *shrub*, 0·5 to 1·5 (rarely 3) m. high, of varying habit, with slender branches, usually more or less downy at the growing tips, *soon becoming*

quite glabrous. Leaves more or less heteromorphous, namely (A) *spring-leaves* at the bases of the barren spurs and the inflorescences with blades oblong to obovate-oblong, blunt to rounded at the tips, acute at the base and 1.5 to 3 cm. by 0.75 to 1.25 cm.; (B) *summer-leaves* with blades obovate to oblanceolate, acutely acuminate and 4 to 6 cm. by 1.75 to 2.75 cm.; all the leaves quite glabrous on the face but usually rather downy on the back in the unfolding bud, *sooner or later becoming quite glabrous*, bright and polished green on the face, turning a rich red or brown in the autumn, closely crenulate with fine hydathodes (see fig. 7) ; leaf-stalks slender, about 3 mm. in the spring-leaves, up to 6 mm. in the summer-leaves. *Corymbs* 8–10-flowered, 3–4 cm. across, *slightly downy or glabrous* ; flower-stalks 6–10 mm. long. *Flowers* widely open, about 12 mm. across. *Receptacle* of the shape of a wide flat top, *perfectly glabrous* (very rarely slightly downy) outside, villous inside. *Sepals* broadly triangular, 1 mm. long, persistent, *indumentum as in the receptacle*. *Petals* white, flushed with rose-colour outside, concave, where flattened out 6 mm. by 4.5 mm., otherwise as in fig. 3. *Stamens* as in fig 4; anthers red. *Ovary* as shown in figs. 2 and 5, its crown densely and persistently villous ; styles 5, 3 mm. long. *Fruit globose*, about 12 mm. in diameter, of a glossy black, very juicy. *Seeds* obliquely and narrowly obovate in outline, 3 mm. long, reddish.

DISTRIBUTION.—Eastern North America from the Great Lakes and South Canada to Florida. O.S.

Fig. 1, a flowering branch, nat. size ; 2, longitudinal section of a flower without petals and with the stamens cut off, $\times 7$; 3, a petal, flattened, $\times 7$; 4, a stamen, $\times 9$; 5, cross section of a young fruit, $\times 6$; 6, a fruiting branch, nat. size ; 7, tip of summer-leaf, $\times 4$; 8, longitudinal section of a fruit, $\times 2$; 9, a seed, $\times 6$.



TAB. 9053.

PRIMULA BEESIANA.

West China.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA L.; *Benth. & Hook. f., Gen. Plant.* II. 631; *Pax in Engl. & Prantl Nat. Pflanzenf.* IV. 1. 105, et in *Engl. Pflanzenr.* IV. 237. 17.

Primula Beesiana, *Forrest in Gard. Chron.* L. 242 c. tab. et fig. 110 (1911); aretissime affinis *P. Bulleyanae*, Forr. sed colore florum roseo-purpureo facile distincta.—*Forrest in Not. Bot. Gard. Edinb.* VII. 106 (1912); *Balf. f. in Journ. R. Hort. Soc.* XXXIX., 166, fig. 74 (1913).

This primula may be called a purple counterpart of the yellow *P. Bulleyana*, figured in an earlier issue of this volume (t. 9026). It resembles it so much in habit and in the details of its structure that in the absence of corollas or with the colour of the flowers destroyed, as is often the case in badly dried specimens, the two primulas cannot be distinguished, except in so far as in living specimens the colouring of the midrib, which is red in *P. Bulleyana* and lilac or flesh-coloured in *P. Beesiana*, may give a clue. Mr. Forrest himself admits their extreme resemblance when he observes: "Excepting in colour, *P. Beesiana* is almost identical at first sight with *P. Bulleyana*," but, he adds, "the two species are never found growing together." Yet the areas inhabited by them overlap very largely. Forrest's localities of *P. Bulleyana* are on the eastern flank of the Lichiang range from 27° 25' to 27° 40' N. and at 3,000 to 3,300 m., and those of *P. Beesiana* in the same range from 27° 10' to 27° 40' N. and at altitudes from 2,700 to 3,300 m. Other specimens of *P. Beesiana* collected by him come from the mountains of Yungpeh (26° 40' N.) and Yungning (27° 48' N.). J. R. Rock obtained there not only *P. Beesiana*, but also *P. Bulleyana*, and he also found both species on the eastern slopes of Mount

Dyinaloko, the northern peak of the Likiang snow range. He further traced *P. Beesiana* as far as Muli in Southern Szechuan, whilst C. Schneider found *P. Bulleyana* to the east of Muli. Nor does there seem to be any difference in the ecological conditions under which they grow—marshy mountain meadows and the sides of streams and ditches. Both primulas have been now in cultivation for some years and their colours have so far as I know proved stable except where hybridisation occurred. This is important from the grower's point of view as their value rests largely on the purity and constancy of their colours. Genetically, however, they seem to be no more than definite colour-strains of an otherwise morphologically uniform unit. If further experience should confirm this view, we shall have no choice but to treat the two plants as colour-forms of one species, *P. Bulleyana*. Concerning cultivation, what has been said of *P. Bulleyana* applies equally well to *P. Beesiana* and need not be repeated.

P. Beesiana was discovered by Forrest in the same mountain range (Lichiang range) and in the same year (1906) as *P. Bulleyana*, but at a slightly lower altitude (2,700 m.) and somewhat earlier (May). Its general range, horizontal as well as vertical, is evident from what I have said above. It was also introduced through the same channel, Mr. A. K. Bulley of the firm Bees Ltd.

DESCRIPTION.—*P. Beesiana* agrees in all respects with *P. Bulleyana* (see t. 9026) except in the following points: *Leaves*, midrib flushed with lilac or pale purple towards the base. *Corolla* rose-carmine to almost magenta or red and deep-rose, with a bright yellow eye.

DISTRIBUTION.—North-western Yunnan and the adjoining parts of Szechuan, about 26° 40' to 28° 5' N. and from 2,700–3,300 m. O.S.

Fig. 1, a flowering plant, the inflorescence cut out and placed in front of the leaves, nat. size; 2, a flower in longitudinal section, $\times 3$.

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PRIMULACEAE. Tribe PRIMULEAE.

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P. Beesiana was discovered by Forrest in the same mountain range (Lichiang range) and in the same year (1906) as *P. Bulleyana*, but at a slightly lower altitude (2,700 m.) and somewhat earlier (May). Its general range, horizontal as well as vertical, is evident from what I have said above. It was also introduced through the same channel, Mr. A. K. Bulley of the firm Bees Ltd.

DESCRIPTION.—*P. Beesiana* agrees in all respects with *P. Bulleyana* (see t. 9026) except in the following points: *Leaves*, midrib flushed with lilac or pale purple towards the base. *Corolla* rose-carmine to almost magenta or red and deep-rose, with a bright yellow eye.

DISTRIBUTION.—North-western Yunnan and the adjoining parts of Szechuan, about 26° 40' to 28° 5' N. and from 2,700–3,300 m. O.S.

Fig. 1, a flowering plant, the inflorescence cut out and placed in front of the leaves, nat. size; 2, a flower in longitudinal section, $\times 3$.



TAB. 9054.

CAMPOMANESIA THEA.

Brazil.

MYRTACEAE. Tribe MYRTEAE.

CAMPOMANESIA, Ruiz & Pav.; *Benth. & Hook. f., Gen. Plant.* I. 712; *Niedenzu in Engl. & Prantl, Nat. Pflanzenf.* III. 7. 72.

Campomanesia thea, *Gilg. & Strauss in Notizbl. Bot. Gart. Berlin*, V. 114 (1909) : inter omnes species generis foliis insigniter crispo-marginatis distincta.

Syn. *Citriosma thea*, Seem. in *Journ. of Bot.* II. 343 (1864).

Siparuma thea, A. DC. in DC. *Prodr.* XVI. II. 657 (1869) ; Perkins & Gilg in *Engl., Pflanzenr.* IV. 101. 115 (1901).

This graceful sweet-scented shrub has been in cultivation for many years under the misleading name *Siparuma thea*, *Siparuma* being a genus of *Monimiaceae* with an entirely different floral structure. It seems to have been introduced to cultivation by M. J. Linden of Brussels more than sixty years ago. Dr. B. Seemann, who saw it in M. Linden's garden in 1864, was so struck by the plant that he described it as a new species of *Citriosma*, *C. thea*—so called in allusion to its fragrance—although it was neither in flower or fruit. *Citriosma* being a later (1794) synonym of *Siparuma* (1775), A. De Candolle changed the name into *S. thea* in his monograph of the *Monimiaceae* (1869), where the species appears among the "dubiae." It was not until many years later (1909) that the flowers became known and the true affinities of the plant were recognized by Professor E. Gilg and the Curator of the Botanic Garden at Dahlem, Herr Heinr. Strauss.

Campomanesia is a large genus of *Myrtaceae*, belonging to the same tribe as the common myrtle. It was named after the Spanish Count Pedro Rodriguez de Campomanes, whom the authors of the genus claim as a patron of botany. According to Niedenzu it includes over seventy species, but not a few have been described

since. Most of them are Brazilian, mainly inhabiting the Campos, the remainder are natives of the Andes from Colombia to Chile, and of Paraguay and Uruguay. Extremely uniform as far as the structure of the flowers is concerned, they differ widely in the shape, consistency and hairiness of the leaves, characters on which the discrimination of the species is largely based. Our species is unique among them owing to the very peculiar crinkling of the margins. It is an extremely graceful plant with sweet-scented flowers and aromatic leaves whose volatile oil is formed in innumerable minute transparent internal glands which are scattered throughout the leaf. The plant is not known to have fruited so far, but the fruits may be expected to be globose many-seeded berries after the fashion of those of our myrtle. *C. thea* is grown at Kew in the Palm House where it does well as a pot-plant in a compost formed of three parts of rich loam and one part each of leaf-soil and sand. In the Botanic Garden at Berlin such pot-plants grew into small trees of up to 3 m. in height, but without ever flowering, whilst one of them which was planted out in the ground in the new "Kolonialhaus," at Dahlem soon produced flowers. Considering that Santa Catharina, the home of our plant, is well outside the tropics, it is doubtful, whether stove-treatment is suitable in this case.

DESCRIPTION.—A graceful *shrub* or small *tree*, 1 to 3 m. high; the young parts finely downy if seen under a strong lens; the bark of the older branches reddish to chestnut-brown. *Leaves* opposite or occasionally sub-opposite, stalked; blades *ovate-elliptic to ovate-lanceolate from a rounded or subacute base, acuminate, sometimes with a terminal gland-tipped bristle, the margins quaintly crisped and wavy, as shown in the plate, 4 to 8 cm. by 3 to 4 cm., very thinly papery, finally quite glabrous, light and vividly green, lateral nerves about 6 or 7 on each side, slender, looping inside the margin; leaf-stalk slender, 5 to 7 mm. long, with persistent down. Flowers* solitary, axillary, pendulous on delicate stalks, 2-bracteolate (see fig. 2), 8 to 10 mm. long. *Receptacle* shortly

bell-shaped with a flat rim, 6 to 7 mm. wide across the top, microscopically downy. *Sepals* roundish, concave, up to 3 mm. long. *Petals* white, delicate, obovate, 8 to 10 mm. long, first spreading, but soon reflexed (see figs. 3 and 1). *Filaments* capillary, 7 to 10 mm. long; anthers yellow. *Ovary* 10-celled, the crown microscopically downy; ovules 2-ranked; style and stigma as in figs. 4 and 5.

DISTRIBUTION.—South Brazil; Santa Catherina, exact locality unknown. O.S.

Fig. 1, a flowering branch, nat. size; 2, a flower-bud, nat. size; 3, a flower, just opened, nat. size; 4, the same with the petals and stamens removed, nat. size; 5, a longitudinal section through a flower, with the petals and stamens removed, $\times 2$; 6, cross-section of receptacle, $\times 6$ (the ovules should have been shown 2-ranked).



TAB. 9055.

BEGONIA MANICATA.

Mexico.

BEGONIACEAE.

BEGONIA, Linn.; *Benth. & Hook. f., Gen. Plant.* I. 841; *Warburg in Engl. & Prantl, Nat. Pflanzenf.* III. 6a. 135.

Begonia manicata, Brongn. in *Herb. Gen. de l'Amateur* III. t. 46 (1842) et in *Hortic. Univers.* IV. 33 cum. t. (1843); *B. megaphylleae*, A. DC., affinis, foliorum laminis anguloso-dentatis (haud grosse lobato-dentatis), petiolis superne fimbriato-manicatis, floribus maioribus, fructibus subaequaliter alatis distincta.—Vis., *Ort. Bot. Padova* in 1842, 135 (1843); A. DC. in *Mart., Fl. Bras.* IV. 1. 388 t. 101 (1861) et in *DC. Prodr.* XV. 1. 341 (1864); Hemsley in *Biol. Centr.-Amer.* 1. 497 (1880); W. T. in *Gard. Chron.* LIII. 135 (1913); *Gard. Chron.* LIX. 145 (1914).

Syn. *B. schizolepis*, Liebm. in *Kjoeb. Vidensk. Meddel.* 1852, 17.

Gireoudia manicata, Klotzsch, in *Abh. Akad. Berlin*, 1855, 125.

Begonia manicata is one of the handsomest begonias, and owing to the ease with which it can be propagated and cultivated it is frequently found in the warmer sections of our green-houses. It is all the more strange that it has never been figured in the Botanical Magazine or in kindred publications, if we except a coloured plate in *L'Herbier General de l'Amateur* and in *L'Horticulteur Universel*, serials which, at any rate in this country, are accessible to few. It was introduced by Jean Linden from Mexico towards the end of the thirties of the last century and distributed to various gardens, among them the Jardin des Plantes and the establishment of Cels Frères in Paris. Adolph Brongniart, Professor at the Jardin des Plantes, soon recognized the horticultural value of the plant and had it figured (1839) for the two French serials mentioned above, where it was published a few years later under the descriptive name *B. manicata*. Cels Frères having communicated at the same time specimens to Professor R. de Visiani of Padua, the latter also called attention to it in his historical account of the

Botanic Garden of that town (published in the early summer of 1843), crediting the name to "Hort. Cels.", whence the frequent erroneous quotation *manicata*, Cels, or *B. manicata*, Vis. Although we do not know exactly when and where Linden discovered the plant we may safely assume that he found it in the same area* where it was soon afterwards collected by Galeotti, Liebmann, and later on by Bourgeau and others, that is in the Cordillera of Vera Cruz approximately between 18° 50' N. and 19° 30' N., and at altitudes from 900 to 1,200 m. According to Liebmann it grows there in shady moist forests and in the equally shady barrancas which cut deeply into the eastern escarpement of the Mexican plateau. The area lies in the transition-zone of the tierra caliente and the tierra templada. Karl Heller who spent a winter at Mirador, the hospitable German hacienda (19° 13' N. by 99° 10' W.), where Liebmann collected our plant, gives 16° C. (61° F.) as the daily average for December and 18° C. (64.5° F.) for January and February, with a minimum of 10° C. (50° F.). At Kew, where the plant grows to great perfection and flowers profusely, it is accordingly kept in a warm greenhouse with an average temperature of 15.5° C. (60° F.) and a good supply of water all the year round. The remarkable power of vegetative reproduction found so frequently in begonias is also characteristic of our plant. Cuttings inserted in sandy soil during April will strike readily and make useful flowering plants for the following winter, beginning to bloom in December and continuing in good condition for three or four months.

The peculiar cuff-like appendages on the leaf-stalks have repeatedly been studied. They are of the nature of emergences into the formation of which the subepidermal parenchyma enters to a varying extent; they become smaller downwards on the stalk and pass finally into typical hairs. Similar fringed appendages occur on the underside of the leaves along the main-nerves. Kerner saw in those cuffs a means of protecting the plant from attacks by snails; but it is obvious that only observation in the field can solve the problem. Two variations of

* Linden collected e.g. *B. megaphylla* at Equilon in the State of Vera Cruz in April 1838, and *B. heracleifolia* at Mirador in February 1839.

B. manicata are known in gardens, one with variegated leaves (var. *aureo-maculata*), the other with proliferously curled margins (var. *crispa*). A figure of the latter may be found in *The Gardeners' Chronicle*, LIX., fig. 54 (1916).

B. manicata belongs to De Candolle's section *Gireoudia*, a very natural group of numerous Central American and South Mexican and a few East Mexican (Vera Cruz) species. They have all erect or ascending, though short, stems, digitately nerved often large leaves, many-flowered panicles, numerous comparatively small flowers with 2 sepals, free stamens, two-lobed stigmas, with the papillae arranged in spiral-bands running from the base to the blunt ends of the lobes, 2-partite placentas covered with ovules on both sides and 3-winged papery fruits. Klotsch proposed to raise the section to generic rank, but his proposal found no favour. Warburg on the other hand extended the section *Gireoudia* so as to include De Candolle's sections *Magnusia* (2 species), *Psathuron* (1 species) and *Rachia* (partly; 2 species), and then named it *Magnusia*. All these additional species are Central American or Mexican and, except for the 3- or 4-sepalous flowers of the sections *Psathuron* and *Rachia*, they are so similar to *Gireoudia* that their inclusion can hardly be objected to, yet there was no reason to change the name, as *Gireoudia* as a sectional name (1859) has priority over *Magnusia* (1864).

DESCRIPTION.—A perennial herb. Stem very stout, up to 35 cm. high, fleshy, somewhat tortuous, green, glabrous, covered with leaves, axillary leaf-tufts and their stipules. Leaf-blades orbicular to obliquely ovate from a cordate base, acute, remotely angular-dentate, 12 to 23 cm. by 12 to 16 cm., fleshy, rich green and glabrous on the face with a red ciliate margin, paler on the back with fimbriate red scales along the nerves; leaf-stalks 8–15 cm. long, fleshy, green, with 2 to 4 fimbriate cuff-like sometimes reflexed appendages near the upper end, the appendages which are blood-red or red with white fimbriae passing downwards into loosely scattered small fimbriate red scales and finally into typical hairs; stipules triangular, very acute or acuminate, often terminating in a fine hair, long-

fimbriate, up to over 2 cm. long. *Panicles* rising high above the leaves on glabrous, green peduncles (20–35 cm. long), loosely and dichotomously branched up to 45 cm. by 25 cm.; *bracts* linear 2–3 mm. long, deciduous. *Male flowers* borne on stalks 5–12 mm. long. *Sepals* 2, almost orbicular, 6 mm. in diameter, white with pink edges. *Stamens* as shown in figs. 4 and 5; filaments quite free. *Female flowers* pendulous on very slender stalks up to over 2 cm. long. *Sepals* similar to those of the male flower, but slightly smaller and more tinged with rose-colour or almost entirely rose-coloured. *Receptacle* up to 12 mm. long with 3 almost equal wings as shown in figs. 1 and 6; wings whitish-rose to rose; placentation as shown in fig. 8; stigmas as in fig. 7. *Capsule* greenish, 3–5 mm. wide excluding the wings which are 2·5–5 mm. wide.

DISTRIBUTION.—Cordillera of Vera Cruz, 900 to 1,200 m.
O.S.

Fig. 1, a leaf-blade, nat. size; 2, upper end of a leaf-stalk with its insertion on the blade, nat. size; 3, a part of an inflorescence, nat. size; 4, a male flower, $\times 2$; 5, an androecium, $\times 4$; 6, a female flower, $\times 2$; 7, stigmas, $\times 6$; 8, a section through a receptacle, with the wings cut off, $\times 10$.



TAB. 9056.

PULSATILLA REGELIANA.

Siberia.

RANUNCULACEAE. Tribe ANEMONEAE.

PULSATILLA, Mill., *Gard. Dict. Abridg. Ed.* 4 (1754); Britton in *Ann. New York Ac. Sci.* VI. 216 (1891); Anemone sect. Pulsatilla, DC., *Syst.* I. 189 (1818) et *Prodr.* I. 16 (1824); Prantl in *Engl. & Prantl, Nat. Pflanzenf.* III. 2. 61; A. subg. Pulsatilla, Benth. & Hook. f., *Gen. Plant.* I. 4.

Pulsatilla Regeliana, Frcyn in *Oest. Bot. Zeitschr.* LI. 378 (1901): affinis *P. montanae*, Reichb., sed flore patenti-campanulato clare violaceo nisi exsiccando ad coeruleum vergente distincta.

Syn. *P. albana* var. δ , Turcz. *Fl. Baic.-Dahur.* I. 39 (1842).

P. albana var. *sibirica*, Reg. & Tiling, *Fl. Ajan. in Nouv. Mem. Soc. Nat. Mosc.* XI. 30 (1858; reprint).

P. montana var. *sibirica*, Reg., *Pl. Radd.* I. 28 in adn. (the Siberian plant), 31 (1861).

Anemone Regeliana, Max., *Fl. Tang.* 10 (1889) et *Enum. Pl. Mongol.* II. t. 3 (1889).

A. ambigua, Turcz. ex Hayek in Urban & Graebn. *Festschrift Aschers.* 466 (1904).

Pulsatilla Regeliana belongs to a group of about a dozen very closely allied species which are spread widely through temperate Asia and Europe from the Bay of Ochotsk to Turkestan and thence on one side through the Caucasus to the Balkans and the Alps as far as South and Central France and on the other through South Russia and Hungary to Central Germany, Denmark and Sweden, shunning the Mediterranean and Atlantic regions, its best known representative being *P. pratensis*, or as it should be called for reasons of priority, *P. nigricans*. They all have nodding flowers and much (pinnately) divided leaves, and they differ mainly in the shape and the colour of the flowers and in the contour of the leaf and the shape of its ultimate segments. As the shape of the flower changes to some extent during its life and cannot easily be preserved in dried specimens, and as the leaves are frequently not fully developed at the time

of flowering, discrimination has often been difficult and the species have consequently become involved in much confusion. A very suggestive, though hardly exhaustive paper by Dr. August von Hayek in the "Ascherson Festschrift" has done good service in clearing up the problem, particularly by the demonstration of the coincidence of the morphological and geographical differentiations of the group. Hayek recognises four distinct species in Siberia. Two of them, *P. cernua* and *P. dahurica*, are generally admitted, the other two, his *Anemone ambigua* and *A. campanella*—he retains *Pulsatilla* as a section of *Anemone*—require further elucidation. *A. ambigua* corresponds evidently to Maximowicz's *A. Regeliana*, a species which Hayek seems to have overlooked, whilst *A. campanella* remains doubtful. It appears to have the leaves of *A. ambigua* and the flowers of *A. albana*. *Anemone Regeliana* or, as I prefer to call it, *Pulsatilla Regeliana*, was described and figured from a number of specimens, collected by Czekanovsky and Potanin in Mongolia and by Potanin and Przevalski in the Thianshan, duplicates of most of which are in the collection at Kew. Maximowicz's figures and the specimens show a certain amount of variation in the size of the leaves and in the degree of their dissection, but the type of dissection is throughout the same and agrees well with the type shown here; the figures, however, of the flowers whose shape has evidently been restored from dried specimens, are less representative. Maximowicz gives the range of the species as extending eastwards to the Baical and Trans-Baical regions and to Amdo in North-eastern Tibet. Where the specimen from which our plate was prepared came from cannot at present be ascertained. It was one of several which had been obtained by Kew about twenty years ago from the late Max Leichtlin and from Herr Sundermann of Lindau. The summer-leaf shown in our plate has unusually long-stalked primary leaf-segments, whilst the divisions of the secondary segments are more spreading and more acute than usual. It represents rather an extreme phase in the range of fluctuation observable in the foliage of this plant, such as might have been induced by the unusually wet summer

of last year when the leaf was drawn; in other years the summer-leaves were very like the leaf shown in fig. 3 of Maximowicz's plate. The salient feature of *P. Regeliana* is in its widely bell-shaped flowers, whose tepals curve outwards from the middle, and in their fine colour, which is rather a bright violet than azure-violet, as Maximowicz describes it from dried specimens in which the colour had assumed a bluish tint. It is a very hardy long-lived plant which requires no special treatment, but as might be expected from a native of sunny dry pastures, stony mountain slopes and open forests, it prefers an open situation and a well-drained soil. At Kew it forms large clumps which from April onward produce a succession of flowers and in normal years fruit freely in July.

I have preferred to treat *Pulsatilla* as a distinct genus, because it appears to me as a very natural, homogeneous and well defined group with a distribution which implies genetic differentiation from a common stock in a geologically not too distant past. All the species belong to the temperate zone of the northern hemisphere, one or two being American, the remainder Eurasian. The African *Anemone capensis*, which was included in *Pulsatilla* by Miller, is a very different type (see Bot. Mag. t. 716 under *Atragene capensis*) in which I can see no approach to *Pulsatilla*. It was subsequently referred by A. De Candolle to a distinct section of *Anemone*, *Pulsatilloides*.

DESCRIPTION.—A perennial, compactly caespitose herb, of the general habit of *Pulsatilla*. Leaves partly developing with the flowers, partly after flowering, the earliest leaves smaller, broader in outline and less divided, the summer-leaves generally much larger, all parts hairy. Spring-leaves—blades rotundate-ovate, up to 3.5 cm. by 4 cm., primary segments sessile, ultimate divisions 5–10 mm. long, deeply lobed or toothed, lobes linear, 1–1.25 mm. wide; leaf-stalks 2–5 cm. long. Summer-leaves—blades ovate-oblong, 7–11 cm. by 5–6 cm.; primary segments obliquely ovate in outline, 28–32 mm. by 22–30 mm., the lowest more or less stalked (stalks

5–25 mm. long); secondary segments obovate-spathulate to rhombic in outline, about 17 by 9–10 mm., deeply, divergently and acutely toothed (the form depicted here) or spathulate, 15–11 mm. by 6–5 mm. with the teeth shorter, less acute and more contracted. Scape 10–15 cm. high, loosely hairy, more or less elongated in fruit. Involucre 2.5–4 cm. long, silkily villous, primary-divisions divided again, below or above the middle, then entire or 2- or 3-toothed, 1.5–2 mm. wide, very acute. Flower widely campanulate, 3–4 cm. in diameter. Tepals curved outwards from about the middle, when flattened out ovate to ovate-oblong, 2–3 cm. by 1.2–1.8 cm., acute, silkily villous on the back, bright violet. Stamens as in figs. 2 and 3; filaments up to 12 mm. long. Ovary villous; style up to 10 mm. long, hairy almost all along. Achenes 3 mm. long; awn (modified style) up to 4 cm. long, plumose.

DISTRIBUTION.—Siberia; from Ajan on the Bay of Ochotsk to Western Mongolia and Chinese Turkestan.

O.S.

Fig. 1, part of a flowering plant with a summer-leaf behind it, nat. size; 2, longitudinal section of a flower, with the tepals cut, $\times 2$; 3, a long stamen, $\times 4$; 4, a pistil, $\times 4$; 5, stigma, $\times 20$.



TAB. 9057.

PROTEA SUBPULCHELLA.

South Africa.

PROTEACEAE. Tribe PROTEEAE.

PROTEA, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 169; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* III. 1. 136.

Protea subpulchella, Stapf (*spec. nov.*): *P. pulchellae*, Andr., arcte affinis, sed capitula foliis summis superata, omnibus partibus multo minora, involucri bracteae intimae tenues, spatulatae, obtusae, brevissime barbatae.

On two occasions, in 1881 and 1889, Sir Joseph Hooker has drawn attention in the pages of this Magazine to the neglect which the *Proteaceae* have suffered from the horticulturists since the time, more than a hundred years ago, when they were a valued and not uncommon feature of the conservatories of this country. It may not be out of place to revert to the subject in the light of our day. In 1810 Robert Brown in his monograph of the *Proteaceae* recorded 36 species* of *Protea* from South Africa. All of these but 5 had by that time been introduced into English gardens, and 23 of them were in cultivation at Kew. The genus was then evidently at the height of its popularity. Forty-six years later Meisner in De Candolle's *Prodromus* accounted for 58 South African species*, whilst the number of those which at one time or another had been taken into cultivation had risen to 40, nearly all the additions since R. Brown's monograph dating from 1816 to 1827. During the next 54 years, however, not a single *Protea* was added to our gardens, and only 2 during the following forty years. When in 1911 the genus was elaborated for the *Flora Capensis*, there were 85 species on record. Yet the Kew Hand-list of Tender Dicotyledons enumerated only 4 species as grown at Kew, one of them a recent discovery. Nor is there any evidence that other gardens were better

* Counting the species as they are understood in *Flora Capensis*.

stocked with proteas. The genus had practically been lost to gardening. The rise and fall of the popularity of these plants is clearly reflected in the number of plates devoted to them in this work. Up to 1810 they claimed 8, from 1810 to 1827 7 plates and after that 1 each in 1881, 1890, 1893 (a new species) and 1919, that is, from 1827 to the present day 4 plates out of a total of 6,276 plates. As to the reasons of this fateful change I may repeat Sir Joseph's remarks in the letter-press to t. 6558 (1881): "This neglect of a whole genus of most conspicuous plants which forms a grand feature in the vegetation of one of England's greatest colonies, is not due to want of beauty, for some of the formerly cultivated species are amongst the handsomest of plants, whether for size, form or colour of inflorescence; and would carry away the first prize at any horticultural show. Of these and many other such the present and even the past generation of horticulturists know absolutely nothing; this is mainly due to the introduction of those improved systems of heating houses and that incessant watering, that favours soft-wooded tropical plants, and is death to the Proteas of South Africa and the Banksias of Australia . . . they once were the glories of the old hot-air heated kilns, that our forefathers called stoves, in which orchids quickly perished, and Banksias and Proteas thrived magnificently." In short, we have lost the art of growing them. Hooker's remarks apply equally well to most of the other genera of South African *Proteaceae*—over 200 species—some of which comprise plants of striking and very peculiar beauty. Those who last year visited the South African section of the British Empire Exhibition at Wembley may remember the singular show of fresh-cut flowers sent weekly from Cape Town in the cold storage room of the Union Castle steamers. *Proteaceae* and especially *Protea* were the most conspicuous feature among them. Their robust beauty, displayed in large vases and bowls, was extremely decorative, but no doubt it would be equally effective in a selection of well-grown plants in the conservatory.

The species figured here is a modest representative of the genus, although very pretty in its own way. It was

placed at our disposal by the courtesy of Professor W. Wright Smith of Edinburgh, where it had been received in seed in September, 1919, from Mr. G. L. Smith, a member of the staff of the Cape Town Botanic Garden, but the exact origin of the seed is unknown. *P. subpulchella* is very closely allied to *P. pulchella*, a native of the extreme south-west corner of Cape Colony and one of the early, but long lost, introductions of *Protea*. *P. pulchella* was never figured in the Botanical Magazine, the plant so called on t. 796 being an Australian member of the family, *Petrophila pulchella*; but there are three rather indifferent figures of it in Andrew's Botanical Repertorium (tt. 270, 277 and 442).^{*} They show some range of variation in the colouring of the flower-heads, but hardly any in their size; nor do the herbarium specimens which I have seen warrant the assumption that *P. subpulchella* is merely a reduced state of a plant whose heads measure 9 to 10 cm. by 5 to 7.5 cm. It has in fact by far the smallest heads of all the species of the *Speciosa* section to which it undoubtedly belongs. This section is confined to the south-western corner of Cape Colony with a few scattered outposts along the south coast as far as Uitenhage. The same corner is also the headquarter of the genus, almost 90 per cent. of its South African species being represented within this area. Typically xerophytic in its anatomical structure *Protea* nevertheless affects localities of very different ecological conditions, here steep rocky hillsides up to altitudes where frosts are not uncommon, as in South Africa, there hot, fire-swept savannas as in tropical East Africa, and again bog-land and the borders of sluggish rivers, as in South Angola. Some habitats of the first type are shown in Marloth's beautiful work "The Flora of South Africa" (Vol. I.), where also some of the best coloured illustrations of South African proteas may be found. It is natural that under the conditions no general rules for the cultivation of proteas can be laid down. Our plant is given at Edinburgh "the treatment usual for South African Heaths, *Leucodendron*, etc., with a sandy soil and airy and dry atmospheric conditions."

^{*} The *P. pulchella* of Bot. Reg. t. 20 is *P. neriifolia*.

DESCRIPTION.—A small *shrub*; branches loosely greyish tomentose, tardily glabrescent. *Leaves* linear-lanceolate, acute, gradually tapering to the base, 5–9 cm. by 8–12 mm., dark green, softly hairy on both sides and villous on the thickened yellowish margins, at length glabrous on the face. *Head* sessile, *overtopped by the erect upper leaves*, obovoid, suddenly contracted at the base into a short stipe, 6 cm. by 3.5 cm., *involucral bracts* about 7–9-ranked, the lowermost (of the stipe) ovate acuminate, silvery, tomentose, the following gradually larger with silky tips and margins, but otherwise sparingly hairy, the upper oblong greenish (drying brown) glabrous except for the small silky tips and the villously-ciliate margins, *the innermost petaloid, exceeding the flowers, spatulate-linear, 5–6 cm. long, 3 mm. wide near the top, thinly scarious, pubescent upwards on both sides, silkily ciliate towards the rounded tips, these bearded with dark purple to blackish soft hairs, hairs up to 2 mm. long.* *Perianth* about 4 cm. long; posticous portion—claw villous except at the dilated 3-keeled base, *lip* 6–7 mm. long with a few long scattered hairs on the back, 2-ciliate, 3-awned, lateral awns 6–7 mm. long, very fine, densely plumose, hairs white intermixed with purple or, towards the tip, all purple, median awn capillary, much shorter or obscure; anticous segment almost capillary, hairy all along. *Fertile stamens* 3; anthers linear, 5 mm. long, apical gland oblong, subacute, under 1 mm. long; barren (anticous) anther 4 mm. long, acute. *Hypogynous scales* oblong 1.5 mm. long. *Ovary* slightly over 1 mm. long, covered with long chestnut-brown hairs; style 4 cm. long, very minutely hairy; stigma 4–5 mm. long.

DISTRIBUTION.—South Africa; exact locality unknown, but probably in the south-west of Cape Colony.
O.S.

Fig. 1, a flowering branch, nat. size; 2, section of a leaf, face-view, $\times 2$; 3, the same, back-view, $\times 2$; 4, an inner bract, nat. size; 5, a flower, the curved style on the left with the stigma held in the lip, nat. size; 6, a flower very slightly enlarged, with the barren segment on the left, the style in the middle and the fertile segment on the right; 7, the lip expanded with the 3 stamens, the apical awns cut off, $\times 7$; 8, the upper part of the barren segment with the barren anther, $\times 8$; 9, base of a pistil with the hypogynous glands in front, $\times 10$; 10, the same with the hairs removed, $\times 4$; 11, stigma, $\times 7$; 12, section of ovary, $\times 4$; 13, ovule, $\times 7$.

CURTIS'S BOTANICAL MAGAZINE.

CONTAINING HAND-COLOURED FIGURES, WITH DESCRIPTIONS AND OBSERVATIONS ON THE
BOTANY, HISTORY AND CULTURE, OF NEW AND RARE

PLANTS FROM THE ROYAL BOTANIC GARDENS, KEW,
AND OTHER BOTANICAL ESTABLISHMENTS AND PRIVATE GARDENS.

EDITED BY

O. STAPE, PH.D., F.R.S.

Late Keeper of Herbarium and Library, Royal Botanic Gardens, Kew.

VOL. CL. (1924).



“With tender heed,
Bringing thee chosen plants and blossoms blown
Among the distant mountains.”—*Wordsworth*.

PUBLISHED FOR

THE ROYAL HORTICULTURAL SOCIETY, LONDON,

BY

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To
LT.-COL. SIR JOHN FOSTER
GEORGE ROSS-OF-BLADENSBURG,
K.C.B., K.C.V.O., LL.D., D.L., J.P.,

WHO BY A RARE COMBINATION OF GIFTS HAS IN A LONG LIFE
ADDED TO THE DISTINCTION OF A SOLDIER, AN AUTHOR AND
A TRUSTED PUBLIC SERVANT THAT OF A MASTER IN THE ART
OF WHICH THESE VOLUMES ARE THE EXPRESSION ; AND WHO
IN ONE OF THE FAIREST CORNERS OF THESE ISLES HAS
PROVIDED A CONGENIAL HOME FOR THE CULTIVATION OF
REPRESENTATIVES OF THE FLORAS OF ALL TEMPERATE
REGIONS WITH A SKILL AND DEVOTION WHICH IS THE
ADMIRATION OF ALL GARDENERS, MANY OF WHOM HAVE
BENEFITED VERY GREATLY BY HIS LIBERALITY, THIS
VOLUME IS DEDICATED AS A MARK OF GRATITUDE AND
APPRECIATION OF HIS SERVICES TO THE SISTER SCIENCES

OF BOTANY AND HORTICULTURE

BY THE

ROYAL HORTICULTURAL SOCIETY.

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ERRATUM.

TAB. 9038—Read in the head-line and throughout the text LAXIFOLIA and *laxifolia* for LAXIFLORA and *laxiflora*.



Arisaema (part of text)

TAB. 9058.

ARISAEMA ELEPHAS.

China.

ARACEAE. Tribe AROIDEAE.

ARISAEMA, Mart.; *Benth. & Hook. f., Gen. Plant.* III. 965; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 3. 150 et in *Engl. Pflanzenreich*, IV. 23 F. 149.

Arisaema elephas, S. Buchet in Lecomte, *Not. Syst.* I. 570 (1911); affine *A. propinquo*, Schott, sed foliis solitariis, spatha potius latiore, eius lamina apice breviter acuminata vel acuta, spadice crassiore et plerumque multo longiore distinctum.—Engler in *Engl., Pflanzenreich* IV. 23 F. 215 (1920).

Syn. *A. Wilsonii*, Engl. l.c. 212 (1920), quoad specimina Forrestiana.

This species belongs to a very natural group of *Arisaema* which ranges through the temperate Himalaya and through the mountains of south-western and western China to Hupeh and Shensi, ascending in the Himalaya and in Yunnan generally to over 3,000 m. and, in the case of one or two species, even to 4,000 m. Of the seven Indian species six are apparently endemic in Sikkim, whilst one is common from Nepal to Kashmir and known to the European residents as "cobra or snake plant" (*A. costatum*).* Six species have been described from China, but a few more may have to be added from the unnamed material at Kew and Edinburgh. They are woodland plants and, at high elevations, denizens of the alpine scrub. They are all dioecious plants with mostly solitary trisected leaves of the type shown in our plate, with variously and sometimes oddly shaped and peculiarly coloured spathes (frequently boldly striped), with the axis of the inflorescence abruptly widened above the flowers and continued as a mostly long, tapering and sometimes flagelliform "appendix," and with anthers

* I have restored Wallich's name "*costatum*" for this plant, as the specimens distributed by him under that name and the drawings he had made of it prove clearly that he meant the "*A. Wallichianum*" of Nepal and the western Himalaya. The faulty representation of the nervation of the leaf in the plate (t. 19) of his *Tentamen Florae Nepalensis* and the equally faulty description of it in the text (p. 28), which was evidently drawn up from the original drawing, have their ultimate source in the imagination of the draftsman. Wallich himself subsequently realized that as his notes on the original drawing show. A later drawing represents the leaf with its correct nervation.

whose cells dehisce by a common curved and frequently crescent- or horse-shoe-shaped slit. The group covers Engler's rather artificially defined series of the *Wallichianae** and *Lunatae*.

Plates 6457, 6474 and 6491 of this Magazine illustrate some of the most striking members of the group. Our species was discovered by the French missionary Armand Delavay who collected it first in the forests of the Lo pin shan near Lankong, N. of the lake of Tali, at an altitude of 3,000 m. in May, 1886. In the following years he found it in various places in the neighbouring mountains as far south as the Tsang shan above Tali fu where it occurs up to 3,500 m., flowering in June. Forrest later on established its extension throughout the Likiang range (to 27° 30' N.) and westwards to the Yangtse-Mekong divide with a preference for open pine forests or moist thickets or the shelter of boulders. Engler included Forrest's specimens (nos. 321, 2385, 4850, 5932) along with others collected by Wilson in Western Szechuan (no. 4570) in a new species *A. Wilsonii*. Forrest's specimens, however, are clearly identical with S. Buchet's *A. elephas*; as to Wilson's I am doubtful. The spathes of the latter are not well preserved, but they seem to lack the very definite striping of *A. elephas* and to have been of a pale more uniform colouring, whilst the leaf-segments are slightly decurrent on distinct stout stalks about 1 cm. long; on the other hand the appendix and the dehiscence of the anthers are as in *A. elephas*. The immediate affinity of the latter is with *A. propinquum*, a species of Sikkim, which itself is intimately connected with the "*A. Wallichianum*" of the Flora of British India.† Our species differs from *A. propinquum* mainly in its solitary leaves, in the size of the "appendix" which is much stouter throughout, and apparently in being altogether a stronger plant. The problem of the distribution and differentiation of *Arisaema* is very interesting, but as Professor Engler, the veteran expert of *Araceae*, has dealt with it at some length in the "Pflanzenreich," it may suffice to point out that the genus ranges from the

* With the exclusion of *A. Delavayi* which, as M. Buchet has pointed out, has to be grouped with *A. Franchetianum*.

† See foot-note on the preceding page. The Sikkim specimens referred to *A. Wallichianum* in the Flora of British India represent a distinct species, *A. sikkimense*, Stapf.

mountains of Central Africa across the Asiatic continent to the Amur and Japan, and that it reappears in two species farther east in the Atlantic and Central States of North America and in one species on the Mexican tableland, and further that the conditions of this distribution are such that the factors which have brought it about must have already been active far back in the Tertiary history of the area of the genus. The very peculiar structure of the inflorescences raises here, as in the case of all *Araceae*, the question of the mode of fertilisation, and as most of the species of *Arisaema* are dioecious the problem becomes the more important whenever we wish to ensure the production of seed. In *A. filiforme* (Java) and *A. Thunbergii* (Japan) pollination is effected by small flies which are attracted by the fetid odour of the inflorescences. We may assume that the same is the case with our plant, but under the conditions under which we have to grow it it will be best to resort to artificial pollination; otherwise the cultural requirements of our arisaema are simple. Professor W. Wright Smith, to whom we are indebted for the specimens depicted in this plate, informs me that he grows *A. elephas* at present in cool frames where it thrives well with little care in a good loamy soil, but there is no reason why it should not do equally well in shaded borders in the open. The young shoots show above ground in the middle or at the end of April and flower late in May. I have only to add that Professor Smith had his plants from Mr. J. C. Williams of Caerhays Castle, Cornwall, and that they formed part of a consignment received from Mr. G. Forrest from Yunnan, no number, however, being attached to them.

DESCRIPTION.—*Dioecious*, both sexes externally alike. *Tuber* flat, 5–6 cm. in diameter, up to 2 cm. high. *Cataphylls* 3, lanceolate, long acuminate, the uppermost mostly 9–13 cm. long, dull violet. *Leaf* solitary; blade of 3 distinct segments, these mostly unequal, the *intermediate* symmetrical, *usually very broadly obovate from a wedge-shaped base and almost truncate at the top with a short cusp*, 10 to 12 cm. long and wide (extremes observed 7.5 by 7 cm. and 22 by 20 cm.), rarely broadly rhombic-elliptic and acutely acuminate as in the plant depicted

(fig. 2), the *lateral* somewhat larger, usually *moderately oblique* or almost symmetrical, *very broadly orate* from an *abruptly contracted base*, *acutely acuminate*, 12 to 15 cm. by 12 to 13 cm. (extremes observed 9 by 6 cm. and 22 by 20 cm.), all segments with a narrow brown-purple wavy border and a *nervation* as shown in fig. 2; leaf-stalk mostly between 28 and 40 cm. high and up to over 5 mm. thick, sheathing up to over one-third of its length, *usually more or less minutely warty*. *Peduncle* mostly 12 to 15 cm. long (extremes observed 7 to 29 cm.). *Spathe* in face-view *obovate-oblong*, mostly 12 to 13 cm. by 5 cm. (sometimes up to 17 cm. long), *shortly or long acuminate* or rather *abruptly contracted into a cusp* (hardly 1 cm. long), *boat-shaped* and *open* except for the basal tube which is 3.5 to 5 cm. long and about 2.5 cm. wide, *maroon-purple with whitish or cream-coloured stripes* which disappear upwards, slightly *glaucous* on the back. *Male spike* 2.5 to 3.5 cm. long and about 1.5 cm. thick; its *axis suddenly thickened* (up to 1.2 cm.) *just above the flowers*, then *continued into a smooth cylindrical appendage* (fig. 5), mostly 13 to 15 cm. long which, if short, *tapers rapidly above the first 4 or 5 cm.*, or, if long, *gradually as shown in fig. 3*. *Male flowers* each represented by 4 or 5 anthers borne on a brown-purple stalk, formed by the union of the filaments and 1.5 mm. long; anthers *dehiscing by a crescent- or horse-shoe-shaped slit* (figs. 5 and 6). *Female spike* 3 cm. long, 5 to 6 mm. in diameter excluding the closely packed ovaries, *bare above the ovaries for 8 to 9 mm.*, then suddenly thickened and continued as in the male plant. *Ovaries* green, ovoid, with a black nipple-like stigma; ovules about 6, as in figs. 8 and 9. *Fruiting spike* about 5 cm. by 2.5 cm.; berries 7 to 9 mm. in diameter, scarlet. *Seed globose*, 3 mm. in diameter.

DISTRIBUTION.—North-west Yunnan; mountains from Tali-fu to the Likiang range and westwards to the Yangtse-Mekong divide, 2,400 to 3,500 m. O.S.

Fig. 1, a plant with the inflorescence cut off, $\times \frac{1}{2}$; 2, middle segment of a leaf, unusually acuminate (see description), nat. size; 3, a female inflorescence, nat. size; 4, a male spike and base of appendage, nat. size; 5, a male flower, $\times 5$; 6, an anther, $\times 7$; 7, a female spike, nat. size; 8 and 9, longitudinal and cross sections of an ovary, $\times 7$ and $\times 10$ respectively.

TAB. 9059.

RHODODENDRON OLDHAMII.

Formosa.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron Oldhamii, Maximowicz, *Rhodod. As. Or.* in *Mem. Ac. Sci. St. Petersburg*, ser. 7, xvi. (1870), reprint 34; affinis *R. mucronato*, G. Don, (*Bot. Mag.*, t. 2901 sub *Azalea ledifolia*), sed foliis pro rata latioribus dorso haud viscidis hirsutie diutius persistente, sepalis plerumque brevioribus, corolla rubra extus haud viscida, capsula sepala excedente distinctum.—Masters in *Gard. Chron.* XVII. 524 (1882); Hemsley in *Journ. Linn. Soc.* XXVI. 28 (1899); Henry in *Trans. Asiat. Soc. Jap.* XXIV., suppl. 57 (1896); J. H. Veitch, *Hort. Veitch.* 286 (1906); Matsumura & Hayata in *Journ. Coll. Sci. Tokyo*, XXII. 218 (1906); Hayata, *ibid.* XXV. 153 (1908); Matsumura, *Ind. Pl. Jap.* II. ic. 463 (1912); Komatsu in *Ic. Pl. Koisik.* II. 69 t. 119 (1914); Wils. & Rehder, *Monogr. Azal.* in *Publ. Arnold Arb.* no. 9, 66 (1921); Millais, *Rhodod.* 220 (1917) et ed. II. 202 (1924).

Syn. Azalea Oldhamii, Hort. Veitch, apud Mast. in *Gard. Chron.* l.c.

R. Oldhamii, var. *glandulosum*, Hayata in *Journ. Coll. Sci. Tokyo* XXV. 153 (1908).

R. longiperulatum, Hayata, *Ic. Pl. Form.* III. 138 (1913).

Rhododendron Oldhamii, an "azalea" in the sense of the gardener, was discovered by R. Oldham near Tamsui in northern Formosa as long ago as 1864. It was eventually introduced into cultivation by Messrs. Veitch who raised plants at Combe Wood from seed communicated by Ch. Maries and exhibited the plant at one of the R. Horticultural Society's shows in 1882. Then it was lost, but reintroduced by Mr. E. H. Wilson who in 1918 sent seeds of it to the Arnold Arboretum which were eventually distributed in America and Europe. According to Mr. Wilson it is the common red-flowered azalea of Formosa where it may be found from sea-level up to 2,900 m., and locally, particularly in the north, in great abundance. Thus it is a conspicuous feature on the wind-swept upper slopes of the volcano Daiton near Taihoku and common around Taihoku itself. It varies considerably in the size of the leaves and calyx-lobes and

to some extent also in the degree of hairiness and glandulosity. Fruiting specimens collected by Schmäser at the South Cape (no. 508A) have leaves not more than 2 cm. by 1 cm. It belongs to the section *Tsutsutsi*, which is characterized by generally persistent leaves and flattened bristle-like rufous hairs, and comprises about 22 species, some of which are only known in the cultivated state. They range from Korea (2 species) to Formosa (7 species) and the Philippines (1 species), being commonest in Japan, and 5 species are recorded from China. The section includes such well-known plants as *R. indicum* (see Bot. Mag. t. 4726 under *Azalea crispiflora*), *R. obtusum* (Bot. Mag. t. 4728 under *A. amoena*), *R. Simsii* (Bot. Mag. t. 1480 under *A. indica*), etc.

Our plate was drawn from a plant grown at Kew as an ordinary green-house plant and under the same condition as are generally given to the so-called "Indian" Azaleas. *R. Oldhamii* is easily propagated by means of cuttings, as half-ripened shoots root readily in a close propagating case with slight bottom heat. In Cornwall *R. Oldhamii* has been grown out of doors, but it has not done well so far. Strains obtained from the upper limit of its vertical range would probably be more resistant. Its beautiful colour and prolonged flowering make it certainly a desirable plant, even if it turn out to be really unsuitable for out-of-door cultivation.

DESCRIPTION.—A much branched *shrub*, 1 to 3 m. high; branchlets densely clothed with spreading rufous partly flattened hairs. *Leaves* thinly leathery, persistent or partly deciduous; *blades lanceolate-oblong to elliptic-ovate from a rounded to subacute base, acute with a gland-tipped point, mostly 3 to 8 cm. by 1·2 to 4 cm.*, dark-green, loosely covered with rufous shaggy hairs which on the face are partly and very tardily deciduous; leaf-stalks shaggy, up to 8 mm. long. *Flowers* in terminal umbels, supported at the base by elliptic-oblong thinly coriaceous perules *up to 15 mm. long, light brown*, the outer appressedly hairy and ciliate upwards, the inner glabrous and viscid; flower-stalks very short, to 10 mm. long, shaggy and partly glandular. *Calyx* as in fig. 3, or the segments

more rounded, *up to 6 mm. long, rarely longer*, green, hairs partly gland-tipped. *Corolla* as shown in the plate (figs. 1 and 4) 3 to 5 cm. wide, up to 4 cm. long, *red or some of the lobes tinged with rose*, very minutely papillose in the tube, *not viscid outside*. *Stamens* 10; filaments unequal, the longest up to 3.5 cm. long, otherwise as shown in the plate. *Ovary* shaggy; style 4 to 4.5 cm. long. *Capsule* broad-ovoid, 8 mm. by 6 mm., more or less shaggy and glandular.

DISTRIBUTION.—Formosa, from the shore to 2,900 m.
O.S.

Fig. 1, a flowering branch; 2, a leaf seen from the back, nat. size; 3, a calyx and pistil, nat. size; 4, a corolla cut open and spread out, nat. size; 5, a stamen in two sections, $\times 5$; 6, pedicel, ovary and base of style, $\times 4$.



TAB. 9060.

SYRINGA POTANINII.

China.

OLEACEAE. Tribe SYRINGEAE.

SYRINGA, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 675; *Knoblauch in Engl. & Prantl, Nat. Pflanzenf.* IV. 2. 7.

Syringa Potaninii, C. Schneider in *Fedde, Repert.* IX. 80 (1910); affinis *S. tomentellae*, Bur. & Franch., sed foliis facie parcissime tenuissime pilosulis vel subglabris, floribus gracilioribus, calyce minore, corolla alba, eius tubo superne vix ampliato et lobis longis angustisque distincta.—C. Schneider, *Handb. Laubholz.* II. 777 (1911) et in Sargent, *Plant. Wilson.* I. 297 (1913).

Syn. *Syringa* sp., Farrer in *Journ. Hort. Soc.*, XLII. 112 (1916).

The lilac, of which a flowering branch is figured here, was raised by Major F. Stern in his remarkable chalk-garden at Highdown near Goring-on-Sea, Sussex, from seed collected by Reginald Farrer (no. 330) in 1914. Farrer connects this number with a shrub which, he says, he found only once in the great Siku gorge (1,300 to 1,400 m.) in southern Kansu, "growing in a big colony amid blocks of mossy detritus from the cliff-wall overhead." It formed a slender very graceful shrub 2 to 2.25 m. high with "insignificant" panicles and small flowers. This was at the end of June and it may be that the "insignificant" panicles were merely the last of the season. At any rate the inflorescences of the plant raised by Major Stern from Farrer's seed hardly warrant the term "insignificant." I have not been able to identify this lilac with any species in cultivation, but I have come to the conclusion that it is the same plant which the Russian explorer Potanin collected nearly thirty years before in the same district, but fifteen miles to the north and at a higher level (2,200 to 2,300 m.), and which Camillo Schneider named after him *Syringa Potaninii*. Potanin gives the date as June 18 (Old Style), that is the first day of July of our calendar, and

the locality as Tan'chang, a village to the south of Minchow, in the deeply dissected loess-country of Southern Kansu. He says nothing about the colour of the flower of his plant and the dried specimens are so far discoloured that it is unsafe to predict on this point, but the dark purple calyx and the faintly purple anthers suggest the presence of more anthocyanine in the corolla than occurs in Major Stern's plant. In every other respect Potanin's and Farrer's plants agree sufficiently to suggest their specific identity, although they may represent slightly distinct colour-strains. The extent to which the shape of the leaves varies—often on the same branch—is remarkable, but the characteristic pubescence—very few and minute hairs on the upper side which indeed often appears glabrous to the naked eye, and a conspicuous silvery-greyish down on the underside—is always the same whatever the shape or size of the leaf. In this respect *S. Potaninii* much resembles *S. tomentella*, a species collected by Bonvalot and subsequently by Wilson in West Szechuan, and no doubt its nearest ally. It differs from it in the scanty and minute pubescence of the upper side of the leaves, in the slender corollas and their relatively long and narrow lobes, and also in the colour of the flowers.

S. Potaninii is perfectly hardy in this country and may be treated like any other hardy lilac. Its late flowering enhances its value as a garden-shrub.

DESCRIPTION.—A *shrub* up to 4 m. high, with delicately downy slender branchlets; leaf-buds ovoid, acute to very acute, 3·5 to 4. mm. long, minutely downy. *Leaf-blades* varying from ovate to lanceolate from a rounded or pointed base, acutely acuminate, 4 to 5·5 cm. by 1 to 2·5 cm., dark green and *very finely or obscurely hairy on the face* (fig. 3), *slightly glaucous and more or less downy on the back, particularly along the nerves* (fig. 4), the latter 3 to 4 on each side, very slanting; leaf-stalks 3 to 5 mm. long, greyish-downy. *Panicles* at the end of this year's branches, up to 10 cm. long and up to 5 cm. wide, leafy in the lower part, finally downy all over; the sweet-scented flowers almost sessile in whorls

of 5 to 10, supported by minute membranous, ovate to lanceolate bracts. *Calyx* cup-shaped, *very obscurely toothed*, 1.5 mm. long, pale or purple, minutely downy. *Corolla white*, glabrous, sometimes flushed with pink (?); tube 9 to 10 mm. long; lobes linear, 4 to 5 mm. by 1 to 1.25 mm., recurved and at length more or less twisted. *Anthers* almost sessile, faintly purplish, yellow or whitish, or the connective orange, 1.75 to 2 mm. long, inserted high up in the tube (sometimes higher up than shown in fig. 7). *Ovary* hairy at the top, otherwise as in figs. 9 and 10.

DISTRIBUTION.—South-west Kansu, in the mountains between Minchow and the Tibetan frontier. O.S.

Fig. 1, a flowering branch, nat. size; 2, two leaves, showing range of variation, one (left) in face-view, the other in back-view, nat. size; 3, part of the upper side of a leaf, $\times 3$; 4, the same seen from the back, $\times 3$; 5, a calyx with pistil, $\times 12$; 6, a corolla in an advanced state, $\times 5$; 7, a flower in longitudinal section, $\times 5$; 8, an anther, $\times 5$; 9, a pistil, $\times 10$; 10, longitudinal section of an ovary, $\times 20$.



TAB. 9061.

PROSTANTHERA ROTUNDIFOLIA.

Tasmania and Australia.

LABIATAE. Tribe PROSTANTHEREAE.

PROSTANTHERA, Labill.; *Benth. & Hook. f., Gen. Plant.* II. 1217; *Briquet in Engl. & Prantl, Nat. Pflanzenf.* IV. 3A. 219.

Prostanthera rotundifolia, *R. Brown, Prodr.* 509; affinis *P. violaceae*, *R. Br.*; sed omnibus partibus robustior, brevissime pubescens, foliis duplo vel triplo maioribus (5–8 mm. longis), corollis maioribus.—*Benth., Lab. Gen. et Spec.* 452 (1834) et in *DC. Prodr.* XII. 560 (1848) et *Fl. Austral.* V. 96 (1870); *Gard. Chron.* 223 (1848); *Hook. f., Fl. Tasm.* I. 284, t. 89 (1860); *Stirling in Trans. & Proc. R. Soc. Vict.* XIX. 21 (1881) et XXI. 42 (1883); *Guilfoyle, Austral. Pl.* 305, fig. in p. 36 (1911).
Syn. P. retusa, *R. Br., l.c.* 509; *Benth., ll. cc.*

In the letterpress, which accompanies the plate of *Prostanthera pulchella* (*Bot. Mag.* t. 8379), the fact of the almost complete disappearance of *Prostanthera* from our gardens was briefly referred to. It may not be out of place on this occasion to insist more particularly on this instance of the changes in interest, taste and, what is perhaps more important, in horticultural skill which determine from time to time the composition of the flora of our gardens and glass-houses. When about a hundred years ago the cultivation of Australian plants was very much in vogue owing to the keen interest aroused by the opening up of a new, peculiar and amazingly rich flora in the youngest of the British colonies, eleven out of the twelve species of *Prostanthera* then (1828) known were in cultivation, most of them having been introduced in the short period from 1823 to 1827. Of these only one seems to have survived, *P. rotundifolia*, the subject of the present plate, and only three have since been added to the list of our green-house plants, although the number of species included in the

genus has meanwhile risen to between fifty and sixty. We had occasion to refer to a parallel case when dealing with the South African *Protea subpulchella* (t. 9057), and many more instances of the eclipse of once popular South African and Australian genera might be quoted.

P. rotundifolia was discovered by R. Brown in June 1804, on the rocky banks of the Tamar River (Port Dalrymple) in Northern Tasmania. It is said to be common along the river near Launceston and beyond it in the valleys of the two Esks, particularly that of the South Esk, but not to occur anywhere else in the island. R. Gunn describes it as one of the handsomest shrubs of Tasmania and as the most easy to cultivate. Sir Joseph Hooker also speaks of it as a most lovely shrub with dark green leaves and beautiful bright purple flowers. According to Sweet it was introduced into cultivation in 1824, but he does not state by whom. Then we do not hear of it again until 1848 when its cultivation was warmly recommended in a note in the Gardeners' Chronicle. At Kew the plant has long been in cultivation as a cool green-house plant; but in the warmer parts of the country it also does well out of doors if given a sheltered position, flowering in April and May. Mr. C. P. Raffill, the Assistant Curator in charge of the Temperate House at Kew, informs me that it thrives best if planted out in a border, but it answers almost equally well if grown in large pots. It succeeds in almost any soil, provided the drainage is good. To ensure good growth and free flowering it requires exposure to full sunshine. It is a rapid grower and soon forms a bush up to 3 or 4 m. high. The plant may be readily rooted from cuttings of the young growth in spring and summer. These should be inserted in very sandy soil in small pots and kept moist and close until rooted.

I have referred above to the limited distribution of *P. rotundifolia* in Tasmania. It is, however, supposed to have a much wider range on the Australian mainland. Bentham in *Flora Australiensis* records it not only from Victoria and South Australia, but also from the interior of New South Wales. To my mind these indentifications are untenable or doubtful and I am

rather inclined to consider our plant as endemic in Tasmania.*

The flowers of *P. rotundifolia* vary considerably in size (from 6 to 12 mm.), but apparently without any relation to sexual conditions. The connectival appendages which are prominent in the anthers of various species of *Prostanthera* and which gave the name to the genus are absent in *P. rotundifolia* or represented only by a slightly prominent ridge running over the back of the anther-cell to a minute papillose point at its base. The concept of the genus varies with different authors. Briquet recognizes three sections, namely *Depresmenilia*, *Cryphia* and *Euprostanthera*. Diels on the other hand refers *Depresmenilia* to *Pityrodia*, an almost exclusively West Australian genus of the tribe *Chloantheae*, but like Bentham he retains *Cryphia*, a group marked by its somewhat differently shaped corolla, in *Prostanthera*, whilst R. Brown, the author of *Cryphia*, saw in it a distinct generic type, as F. von Mueller did when he described it under the name *Klanderia*. These are questions which have still to be considered; but, however that may be, the bulk of the species clearly follow the type of *P. lasianthos*, the standard species of the genus and of the section *Euprostanthera*, which includes our species. This is a group confined to extratropical East and South Australia with a slight extension to southern West Australia (2 species) and to Tasmania (3 species).

DESCRIPTION.—A graceful shrub, 1 to 4 m. high; *all parts more or less minutely puberulous and glandular and*

* Of the specimens enumerated by Bentham under *P. rotundifolia* from Australia proper I have seen the following :—(1) N.S. Wales, west of Wellington valley, *A. Cunningham*; the original of Bentham's *P. cotinifolia*, a clearly distinct species. (2) Victoria, Genoa River, *F. Mueller*; a new species, *P. subsessilis*, Stapf, characterised by small, sessile or nearly sessile flowers with strongly nerved very unequally lipped calyces. (3) Victoria, Buffalo Range, *F. Mueller*, and Mt. Arepiles, *Dallachy*. Mueller's specimens are barren and partly galled and apparently identical with barren specimens collected by Mitchell in 1836 in Western Victoria (?); Dallachy's specimen consists of a good flowering branch. All these have very stout, entire, or rarely subentire leaves, and Dallachy's specimen, small flowers and they probably represent a distinct species. The only specimen which approaches *P. rotundifolia* so closely in its foliage as to suggest specific identity is one collected by J. W. Andas near Chataqua Peak in the Grampian mountains, West Victoria; but its flowers are rather small and arranged in longer and narrower racemes and the mature calyces are much smaller than those of *P. rotundifolia* and strongly nerved. This too may have to be treated as specifically distinct.

aromatically scented. *Leaf-blades* broadly obovate to rotundate with a shortly wedge-shaped base and a rounded apex, frequently with one or two blunt crenae on each side in the upper half (see fig. 2) or else entire, very variable in size in the same or in different individuals, but mostly 5 to 8 mm. long and wide, the glands as shown in fig. 3, sunk in pits in dried specimens; leaf-stalks 2 to 4 mm. long. *Flowers* mostly 5 (occasionally up to 9, rarely more) in loose or contracted leafy racemes at the ends of short branchlets; floral leaves much reduced; *flower-stalks* 2–3 mm. long with a pair of small linear bracteoles close to or below the calyx. *Calyx* widely open in the flower, almost equally 2-lobed (fig. 5), about 3 mm. long, enlarged in fruit, 5–5.5 mm. long, with the nerves of the tube raised but with the lips quite smooth, the lower lip slightly incurved over the mouth. *Corolla* as in figs. 4 and 6, variable in size, 6–12 mm. long, bright violet. *Stamens* nearly equal, as in figs. 6 and 7; the anther-cells without an appendage, but with a papillose point at the base. *Style* 7–8 mm. long (fig. 8). *Nutlets* oblong, 2–2.2 mm. long, longitudinally wrinkled.

DISTRIBUTION.—Tasmania, Tamar basin; doubtful in Victoria. O.S.

Fig. 1, a flowering branch, nat. size; 2, upper part of a leafy branch, $\times 3$; 3, a part of a leaf with glands, $\times 100$; 4, a flower, $\times 3$; 5, the calyx of the same, $\times 8$; 6, a corolla cut through the middle-lobe of the lower lip and opened out, $\times 3$; 7, a stamen, $\times 8$; 8, a pistil, $\times 8$; 9, nutlets in front and back view (from the original specimen of R. Brown).



TAB. 9062.

PRUNUS YEDOENSIS.

Japan.

ROSACEAE. Tribe PRUNEAЕ.

PRUNUS, L.; *Benth. & Hook. f., Gen. Plant.* I. 609; *Focke in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 51.

Prunus yedoensis, *Matsumura in Tokyo Bot. Mag.* XV. 100 (1901): *P. pseudo-ceraso*, Lindl., proxima, sed perulis interioribus et bracteis elongatis, hisce (saltem superioribus), inciso-dentatis, floribus paulo maioribus, receptaculo magis elongato et tubuloso, sepalis magis elongatis argute dentatis, stylo pilosulo distincta.—*Koehne in Sargent, Pl. Wilson.* I. 252 (1912); *Koidzumi in Journ. Coll. Sci. Tokyo XXXIV.* 262, fig. 1 (1913); *Wilson, Cherr. Japan in Publ. Arn. Arb.* no. 7, 15, t. 4 (1916).

Syn *P. yedoensis* var. *nudiflora*, *Koehne in Fedde Rep.* X. 507 (1912).

P. paracerasus, *Koehne in Fedde Rep.* VII. 133 (1909) et in *Mitt. Deutsch. Dendr. Ges.* XVIII. 170 (1909); et in *Sarg. Pl. Wilson.* I. 246 (1912); *Schneid. Handb. Laubholz.* II. 984 (1912).

As Mr. E. H. Wilson has written fully on this tree, one of the most popular and certainly most beautiful of the Japanese cherries, in his monograph "The Cherries of Japan," and as his opportunities for the study of this intricate group are unrivalled, I confine myself to an epitome of his account, adding only such observations of my own as are suggested by my knowledge of the trees at Kew and by a memorandum by Mr. Paul Russell which Mr. W. Popenoe of the Bureau of Plant Industry, Washington, has kindly placed at my disposal.

"This is," Mr. Wilson says, "the Cherry so generally planted in the parks, temple grounds, cemeteries and streets of Tokyo, and its flowers herald an annual national holiday decreed by the Emperor. In all over fifty thousand trees of this species are growing in the precincts of the city of Tokyo." Its Japanese name is Yoshino-zakura. It is only known in the cultivated state, and the statement, quoted by Matsumura, that it came originally from the island of Oshima in the province of Izu, rests, according to Wilson, on a confusion with the

wild form of *P. Lannesiana* (Bot. Mag. t. 8012 under *P. pseudo-cerasus*). The same author also suggests that it may be a hybrid between the wild *P. Lannesiana* and *P. subhirtella* var. *ascendens*, perhaps better known as *P. Miqueliana*, Max. The introduction of this tree into English and American gardens is of a very recent date. The Arnold Arboretum received a tree from the Tokyo Botanic Garden in 1902, Koehne recorded young trees in Germany in 1909, and Kew obtained its specimens only a few years ago from the nursery of Hillier & Sons at Winchester. It is from one of these that our drawing was prepared last year (1924). It is a perfectly hardy tree, quick-growing, but apparently short-lived. In Japan it attains a height of 13–16 m. with a head up to 16 and even 20 m. in diameter. In Washington there is a beautiful plantation of it around the Tidal Basin, Potomac Park, comprising hundreds of trees in excellent condition. They form part of a gift by the Mayor of Tokyo to the City of Washington. They begin to bloom normally early in April, forming beautiful cloud-like masses of delicate pink unmarred for some days by the intervention of other colours, except the silvery-grey of the branches, the leaves unfolding only tardily. At Kew, the foliage appears rather earlier, but it can hardly be said that it spoils the effect produced by the flowers which pass as they open from a pure rose in the bud to a, finally, pure white. In Japan, we understand, *Prunus Lannesiana* is commonly used as a stock for the grafting of our plant, but in districts with a more rigorous climate *P. serrulata* var. *sachalinensis* has been recommended.

DESCRIPTION.—A tree, in Japan up to 16 m. high, with a short trunk and wide-spread branches forming a head up to 20 m. in diameter; young branchlets minutely hairy; old bark pale grey and smooth. *Winter-buds* 4–7 mm. long; outer bud-scales broadly ovate, brown with blackish tips; inner herbaceous scales oblong, notched, hairy, up to 1 cm. long. *Leaves* unfolding with or soon after the flowers; blades bright green at first, then slightly darker but still pure green, ovate to ovate-elliptic, from a roundish or subacute and usually 2-glandular base, acuminate, very closely and sharply subulate-dentate.

when full grown 5–10 cm. by 5 cm., glabrous above, *very sparingly, or, on long shoots, more densely hairy on the back*, nerves 9–13 on each side; leaf-stalks up to 2 cm. long, finely hairy; stipules narrowly linear 1–2 cm. long, with a loose fringe of shortly stalked glands. *Flowers* 2–6 in loose corymbs; bracts spatulate to narrowly oblong, the tip with long gland-tipped teeth, hairy; flower-stalks up to over 3 cm. long, more or less softly hairy. *Receptacle tubular or upwards almost bell-shaped, 6–7 mm. long*, dull red, more or less softly hairy, particularly near the base. *Sepals oblong, more or less sharply dentate. Petals* roundish elliptic-obovate, notched, up to 16 by 9 to 11 mm., pink in the bud, then fading to a very faint rose or pure white. *Filaments* up to 7 mm. long. *Styles hairy up to the middle. Drupe* globose, 1 cm. in diameter, black with red juice when quite ripe, bitter.

DISTRIBUTION.—Only known in cultivation. O.S.

Fig. 1, a flowering branch, nat. size; 2, a young inflorescence, nat. size; 3, a flower in longitudinal section, $\times 2$; 4, a pistil, $\times 4$; 5, a fruit full grown but not yet with its final colour, nat. size.

TAB. 9063.

VIBURNUM GRANDIFLORUM.

India.

CAPRIFOLIACEAE. Tribe VIBURNEAE.

VIBURNUM. Linn.; *Benth. & Hook. f., Gen. Plant.* II. 3; *Fritsch in Engl. & Prantl, Nat. Pflanzenf.* IV. 4. 163.

Viburnum grandiflorum, Wall. ex A. P. DC., *Prodr.* IV. 329 (1830); arcte affine *V. foetenti*, Decne, sed foliis dorso pubescentibus pube in nervis diu persistente, perulis interioribus bracteisque primariis sericeis, cymis magis contractis multo magis pubescentibus distinctum.

Syn. *V. nervosum*, Hook. f. & Th. in Journ. Linn. Soc. II. 178 (1858); Brandis, *For. Fl.* 259 (1874) et *Ind. Trees*, 363, 711 (1906); Maxim. in *Bull. Ac. Sci. Petersburg*, XXVI. 484 (1880) et in *Mel. Biol.* X. 659 (1880); C. B. Clarke in Hook. f., *Fl. Brit. Ind.* III. 8 (1882); C. Schneider, *Handb. Laubholz.* II. 667 (1911); Rehder in Sargent, *Trees & Shrubs*, II. 106 (1908); nec D. Don, nec. Hk. & Arn.

Solenotinus nervosus, Oerst. in *Vidensk. Medd.* 1860, 295.

Two very similar precociously flowering species of *Viburnum* have long been known from the Himalaya, one, *V. foetens*, confined to the extreme west (Chamba, Southern and Central Kāshmir, Hazara and Chitral), the other, the plant figured in this place and generally known as *V. nervosum*, ranging from Lahul and Kunawur to Bhootan. Both have very similar flowers and foliage; but whereas the flowers of *V. foetens* are grouped in loose and very sparingly hairy inflorescences, those of "*V. nervosum*" are contracted into clusters which owing to the densely pubescent inner perules and bracts appear more or less silky at the base. Further, the leaves of *V. foetens* are glabrous except for short tufts of tardily developing hairs in the nerve-axils, whilst those of the other species are more or less downy in the bud, especially on the back, the down which consists partly of fascicled and partly of simple hairs persisting in the mature leaf on the nerves of the underside. Both species ascend to considerable altitudes, *V. foetens* to

3,400 m., "*V. nervosum*" to over 3,000 m. west of Nepal and to 3,900 m. in Sikkim. The reason why the name "*nervosum*" was ever applied to our species is not clear. *V. nervosum* is a species described by D. Don from a specimen collected near Srinagar, Tihri Garhwal, and communicated by Wallich to Lambert prior to the general distribution of his plants. Unfortunately the specimen cannot be traced at present; but to judge by Don's description it is undoubtedly identical with the *V. cordifolium* of Wallich's catalogue (no. 462). This was described by A. P. De Candolle in the *Prodromus* (1830) immediately after *V. nervosum* and in terms practically identical with those of Don's diagnosis, and it was placed in the section *Lentago* which contains e.g. *V. Lantana*.* On the other hand it is quite certain that the plant figured here is Wallich's *V. grandiflorum* (no. 464) which De Candolle described under his section *Solenotinus* and of which there are two sheets in the Wallichian Herbarium. Another species which has become connected with our plant is Bunge's *V. fragrans*, a shrub of Northern China, but only known in cultivation. It has been suggested by Maximowicz that the two may be identical, but although they are closely allied this is certainly not the case, *V. fragrans* having much smaller sharply serrated leaves either glabrous in the bud or at any rate becoming glabrous at an early stage, excepting occasional tufts of minute hairs in the nerve-axils of the back, and smaller flowers in almost perfectly glabrous inflorescences. It was already known to J. G. Gmelin who in *Flora Sibirica* III. p. 135, t. 25 (1768) gives a full account and a good figure of it under the phrase *Lonicera ramis terminantibus compositis, laxis, umbellatis, foliis serratis*. He had the plant from a Russian surgeon, who had found it near the "Great Wall." Pierre d'Incarville, the French missionary, after whom *Incarvillea* was named, also obtained it—no doubt in gardens—at or near Peking about the same time. A plant of *V. fragrans* raised by Mr. E. A. Bowles flowered in his garden at Waltham Cross from October to November, 1922, the flowers being very fragrant and white, faintly

* According to Don, Wallich had actually written up the Srinagar specimen of *V. nervosum* as "*Viburnum Lantana*."

tinted with pink. Its normal flowering time in China is, however, late April and May.

The views which systematists have taken concerning the natural differentiation of the genus *Viburnum* differ widely. I have already pointed out that De Candolle placed our species along with *V. foetens* in a section *Solenotinus*. Maximowicz removed both to his section *Viburnum*. Rehder again includes them in a new section *Thyrsosma*, where they form a small group distinguished from the bulk of the section by the precocious flowers and by the stamens being inserted in the corolla tubes at different levels. Space forbids to enter on the question beyond the statement that *V. grandiflorum*, *V. foetens* and *V. fragrans* form certainly a very natural group which approaches rather closely to *V. erubescens*, a species which originally became known from the Himalaya, but has recently been claimed also for Western China. Franchet's *V. nervosum* from Moupin may be the Chinese "*V. erubescens*."

We are indebted to the Marquis of Headfort for the specimen which served for the preparation of the present plate. He had it from the Botanic Garden at Glasnevin, Dublin, where it had been raised from seed presented by Mr. A. K. Bulley and collected (no. 3023) in 1914 by Mr. R. E. Cooper in Bhutan in conifer- and rhododendron-forests at an elevation of 3,750 m. It flowers with Lord Headfort very early (in January) and it is perfectly hardy, as it is elsewhere in these islands, although the flowering may be more or less delayed, as for instance at Kew, where it did not flower this year until early March. It generally does not set fruit except when pollinated artificially. The fruits shown in the plate were obtained in that way by Lord Headfort. Apart from being an early flowerer this shrub is particularly valuable on account of the charming pure colours of the flowers and their sweet scent.

DESCRIPTION.—A shrub or small tree, up to 2 m. high, with gnarled branches, with a grey or brown coarsely lenticellate and often very rough bark, the young branchlets pubescent or more often glabrous from the beginning. *Leaves* developing after the flowers;

blades elliptic-oblong, rarely elliptic from an acute base, acuminate, toothed, 6–9 cm. by 2·5–4 (rarely 5) cm., densely pubescent to tomentose on the back and minutely and loosely pubescent on the face when unfolding, soon becoming glabrous except on the nerves and in the nerve-axils on the back with the hairs mostly fascicled, dark green above, nerves 7–8 on each side, very oblique, almost straight or gently curved, impressed above, prominent below, transverse veins fine; leaf-stalks 1 to 1·5 cm. long, glabrous or pubescent. *Flowers* sessile, in fascicled or racemosely arranged clusters, contracted into more or less dense heads at the end of leafless spurs, the fascicles at first supported by ovate to rotundate-ovate subapiculate perules, the outer of which are about 1 cm. long, almost leathery, dark brown and finely pubescent or glabrous, whilst the *inner* are tomentose on the back and on the edges inside, perules deciduous as the inflorescence expands; *bracts oblong to linear with the hair-covering of the inner perules if not more shaggy and silvery*, up to over 1 cm. long; *bracteoles at the base of the flowers similar but much reduced*; peduncles pubescent, very short during flowering. *Receptacle and calyx* as in figs. 5 and 7, the former about 3 mm., the latter 1 mm. long. *Corolla* white, richly tinged with pink on the outside; tube to over 1 cm. long; lobes 5 mm. long, otherwise as in figs. 4 and 8. *Stamens* inserted at different levels (see fig. 8); filaments up to 3 mm. long; anthers 2 mm. long. *Style* very short; stigma disc-shaped, red. *Ovary* 1-celled by abortion (fig. 7). *Drupe*s ellipsoid or oblong-ellipsoid, about 12 mm. by 8 mm., blackish-purple, mostly only one of a cluster ripening, borne on the lengthened peduncles. *Stones* broad-ellipsoid, one-seeded, slightly flattened and grooved on one side, 8 to 9 mm. by 5 to 6 mm.

DISTRIBUTION.—Temperate Himalaya from Bhutan to Kunawur and Lahul, 2,100 to 3,900 m. O.S.

Figs. 1 and 2, inflorescences, nat. size; 3, a leafy branch at the time of maturity, nat. size, the leaves rather broader than usual; 4, flower-buds, nat. size; 5, a flower with the corolla removed, supported by its bracts and bracteoles, $\times 4$; 6, hairs of a bract, $\times 89$; 7, a longitudinal section of a flower with the corolla removed, $\times 8$; 8, a corolla opened out, $\times 2$; 9, stamens, $\times 4$; 10, a fruiting branchlet, nat. size; 11, seeds, seen in front- and back-view, $\times 2$.



TAB. 9064.

PRIMULA EDGEWORTHII.

India.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 631; *Pax in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 105 et in *Engl., Pflanzenr.* IV. 237. 17.

Primula Edgeworthii, *Pax in Engl., Pflanzenr.* IV. 237. 41 (1905); *P. petiolaris* Wall. apud Roxb., affinis, sed foliis vernalibus ut tota planta vere magis minusve albo-farinosis late spatulatis longe sensim in petiolum alatum attenuatis, foliis aestivalibus multo maioribus viridibus e basi breviter cuneata vel subtruncata vel leviter cordata late ovatis vel ellipticis irregulariter grosse dentatis vel lobulato-dentatis, lobulis saepe iterum denticulatis serrulatisve, calycis lobis sub anthesi oblongis vel ovato-oblongis acutis (haud subulato-acuminatis), maturitate auctis late ovatis subpatentibus distincta.—Craib in *Journ. Roy. Hort. Soc.* XXXIX. 186 (1913).

Syn. *P. petiolaris*, Wall., *Tent. Fl. Nep.* 42, t. 31 (1826) quoad plantam Kumaonensem; non Wall. apud Roxb., *Fl. Ind. ed. Carey* II. 22 (1824).

P. pulverulenta, Edgeworth ex Strachey, *List Kumaon Pl.* (1852 ined.) et ex W. Watson in *Atkins., Gaz. N.W. Prov. & Oude*, 520 (1882; nomen tantum); non Rafin.

P. petiolaris var. *pulverulenta*, Hook. f., *Fl. Brit. Ind.* III. 493 (1882); *Pax in Engl. Bot. Jahrb.* X. 175 (1889) et in *Engl., Pflanzenr.* l.c. 41 (1905); *Duthie, Cat. Pl. Kumaon, ed. rev.* 258 (1906).

P. petiolaris var. *Edgeworthii*, Hook. f., l.c.; *Pax in Engl. Bot. Jahrb.* l.c.

P. Winteri, W. Watson in *Gard. Chron.* XLIX. 130 fig. 63 (1911); Craib in *Journ. Roy. Hort. Soc.* XXXIX. 186 fig. 89 (1913); *Gard. Chron.* LV. 238, fig. 105 (1914) et LXVIII. 311 fig. 144 (1920); J. E. G. White in *Gard. Chron.* LXXI. 19 fig. 10 (1922); Chittenden in *Journ. Roy. Hort. Soc.* XLVIII. 60 (1923).

The species figured here was proposed by the late W. Watson as a new species, to which he gave the name *P. Winteri*. Photographs of it were repeatedly reproduced showing the plant in its flowering condition on which indeed its rare charm rests. In this state "*Primula Winteri*" was also drawn for our Magazine and the plate was printed off and coloured when, during the final preparation of the letter-press, it was discovered to be connected with a plant which in the course of time had received more than one name and specimens of which had been lying in herbaria for a hundred years. This discovery showed not only that the species had a much wider distribution than was assumed but also that it exhibited an exquisite seasonal dimorphism, the spring-stage representing "*Primula Winteri*" and the summer-stage a form which was at one time (1882) proposed as a distinct variety of *P. petiolaris* and subsequently as an independent species, *P. Edgeworthii*. Our plant was, in

the spring-condition, discovered by Richard Blinkworth, Wallich's active correspondent, in Kumaon (the locality is not stated) about 1824. Wallich took it for his *P. petiolaris* which he had just described in Roxburgh's "Flora Indica" from specimens received from Nepal, and he distributed it along with the Nepal plant (Wall. Cat. 603) under that name. About 25 years later Captain Edward Madden collected the plant in the same condition below the Pindari glacier (3,000–3,100 m.) in Kumaon, his specimens being named by Edgeworth *P. pulverulenta* n. sp. in MS. In May 1847, Lieut. (afterwards Sir) Richard Strachey too found it there but a little higher up (3,600 m.) and also on Champwa Peak (3,700 m.) in the Ramganga valley above Namik, not many kilometers to the south, and these specimens (no. 9) were entered in Strachey's "List of Kumaon Plants" as *P. nana*, a species based by Wallich on specimens from Gossain Than in Nepal. Edgeworth as well as Strachey also collected the plant in its mature condition with summer leaves and fruits, but neither suspected the ontogenetic connection existing between the two states. Edgeworth's specimens which came from Tunghnat (2,400–2,700 m.) in the valley of the upper Alaknanda River in British Garhwal (1844) remained unidentified, whilst Strachey's which were obtained below the Madhari Pass (at 2,400 m.) to the west of Namik were referred in his "List" partly to *P. pulverulenta* (no. 8) and partly to *P. petiolaris* (no. 11). The determination of no. 8 rested evidently on the comparison with specimens collected by T. Thomson in the mountains near Simla (2,100–3,000m.) in the summer of 1848 and 1849, and distributed by him as *P. pulverulenta*, Edgew. When Hooker worked out the *petiolaris*-group for the flora of British India, he was so impressed with the different appearance of the two seasonal states that, taking *P. petiolaris* in a very broad sense, he referred them to two distinct varieties, the spring-state becoming *P. petiolaris* var. *pulverulenta* and the summer-state *P. petiolaris* var. *Edgeworthii*. More recently, Pax (1889) in his revision of *Primula* and Duthie (1906) in his revised edition of Strachey's "Catalogue" followed him, but when Pax came to deal with these plants in the *Pflanzenreich* he considered himself justified to separate the variety *Edgeworthii* as a species from *P. petiolaris*. As we now know

that Edgeworth's *P. pulverulenta* and Pax's *P. Edgeworthii* represent merely seasonal stages of a plant clearly distinct from *P. petiolaris*, and as Edgeworth's earlier name was never supported by a description there is, under the commonly accepted rules of nomenclature, no choice but to give our plant Pax's name *P. Edgeworthii* (but see below). When in 1911 Mr. Winter's plant came into the field, the tangle of names was still unravelled and the complete life-history of our plant unknown. No wonder that Mr. Watson acclaimed the new-comer as a species yet undescribed. However that may be, all friends of gardening will be indebted to Mr. Winter for enriching our collection with one of the most charming and biologically interesting of the early flowering primulas. Its introduction into our gardens ought to stimulate us to pay the attention to the *petiolaris*-group which Sir George Watt has already claimed for it 20 years ago. It is a group of wide range and great wealth of forms. The only previous attempt at introducing it to cultivation was made by Sir Michael Foster who grew a form figured in this Magazine as *P. petiolaris* var. *nana* (tab. 7079). It is represented as a plant very similar to the one depicted here but quite green at the time of flowering, with more purplish flowers, a shorter corolla-tube and a limb hairy around the eye. The plant has been lost and, as no specimen was preserved, I am unable to check the figure and the description. It is for the present an obscure plant, but certainly not *P. petiolaris* var. *nana*, that is Wallich's original *P. nana*. The latter is, to judge by the meagre specimens available, indeed very similar to *P. Edgeworthii* in the spring-stage, and it is not impossible that further material from Gossain Than may prove it to be identical with it, in which case the name *P. nana* would naturally supersede *P. Edgeworthii*.

As to the details of the introduction of our primula and its cultivation I must refer to a paper by Mr. Chittenden in the Journal of the Royal Horticultural Society (Vol. XLVIII., 1923) and content myself with the statement that Mr. E. L. Winter, late Commissioner of Kumaon, found it in the spring of 1908 in a ravine some "eight marches north of Naini Tal" at about 3,000 m., which would be in the neighbourhood of the Pindari glacier. It was growing by the edge of the snow "with 20 or 30 flowers: at that elevation and with that clear

atmosphere really blue without that mauvish tint which it has chosen to assume in duller England." He sent seed home next year and Mr. R. E. Gill of Falmouth raised plants from it which flowered in 1911. It was from them that the late Mr. W. Watson described the species.

DESCRIPTION.—A perennial herb with the habit of *P. acaulis*. Scape very short, mostly under 1 cm., or hardly any. Leaves dimorphous. Spring-leaves tightly packed in the winter-bud, mostly densely mealy (meal white), when unfolded and full-grown broadly spatulate, very blunt, very gradually passing into a short winged often indistinctly differentiated stalk, 3 to 4 cm. by 2 to 3 cm., irregularly dentate or erosulate-serrulate; summer-leaves broad-ovate or almost deltoid or elliptic from a shortly wedge-shaped or truncate or slightly cordate base, blunt or shortly acute, irregularly and coarsely toothed or almost lobulate with the teeth dentate or serrate, 5 to 10 cm. by 4 to 8 cm., green, borne on well differentiated stalks, 5 to 15 cm. long, and slightly or not at all winged; intermediate leaves connecting the two main types of leaves. Inflorescence umbel-like, white-mealy, up to 20- or even 30-flowered; flower-stalks slender, 2 to 7 cm. long. Calyx tubular-campanulate, 9 to 12 mm. long, 5-lobed almost to the middle, mostly densely mealy; lobes oblong to ovate-oblong, acute, enlarged and persistent in the fruit, triangular-ovate, up to 5 mm. long by up to over 5 mm., spreading. Corolla-tube funnel-shaped in the upper third, 10 to 14 mm. long, yellowish outside, rich yellow in the throat; limb mostly 5-, occasionally 4-lobed, clear mauve with a white eye, 2.5 to 3 mm. across, pale and mealy outside; lobes broad-obovate, irregularly and sharply toothed. Anthers as in fig. 4, inserted as shown in fig. 3. Style 1 cm. long; stigma as in fig. 5. Capsule globose with a slightly depressed crown, 6 to 7 mm. across, tightly enclosed in the calyx tube.

DISTRIBUTION.—Inner Himalaya, from Simla to Kumaon, on wet rocks and in woods, 2,100 to 3,700 m.
O.S.

Fig. 1, a plant, spring-form, nat. size; 2, a leaf, intermediate type, nat. size; 3, a longitudinal section of a flower, $\times 2$; 4, an anther, $\times 6$; 5, upper end of style and stigma, $\times 10$.



TAB. 9065.

MAXILLARIA LEPIDOTA.

Colombia and Ecuador.

ORCHIDACEAE. Tribe MAXILLARIINAE.

MAXILLARIA, Ruiz and Pavon; *Benth. & Hook. f., Gen. Plant.* III. 555; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 187.

Maxillaria lepidota, Lindl. in *Ann. & Mag. Nat. Hist.* XV. 383 (1845); affinis *M. arachniti*, Reichenb. f., sed floribus maioribus discoloribus, sepalis 5—6 cm. longis longissime caudatis infra caudas rubro-brunneas pallide luteis distincta.—Reichenb. f. in *Gard. Chron.* IX. 168 (1878); Veitch, *Man. Orch.* Pl. IX. 156 (1893).

Syn. (?) *M. pentura*, Lindl., *Orch. Linden.* 21 (1846).

This is one of several closely related species which, as for instance, *M. longisepala* and *M. arachnites*, are distinguished by the tail-like extension of their sepals. In *M. longisepala* these are almost twice as long as in our species, but of the same colour, whilst in *M. arachnites* they are shorter (3 cm.) and at the same time like the petals pure yellow throughout. *M. lepidota* was discovered by Hartweg near Popayan in southern Colombia in 1841 or 1842. Later on Friedrich Lehmann, who collected so successfully in Colombia, found it growing commonly on the trees of the dense forests on the western slopes of the Andes of Cuenca in Ecuador up to 2,400 m. He describes it as forming frequently large and freely flowering clumps. One of his fine paintings (no. 330) made on the spot—there is a large collection of them at Kew—is a very good match of our plate. If Reichenbach's reduction of Lindley's *M. pentura* to *M. lepidota* is correct, the area of our species extends from Colombia to the border districts of Venezuela, *M. pentura* having been collected by Jean Linden in the neighbourhood of Merida at the low altitude of 1,800 m. Linden's specimen in the Kew collection agrees indeed very well with *M. lepidota*, and his note, according to which the

flowers are reddish, may refer only to the tails of the sepals which are a conspicuous feature in our plant. The group to which *M. lepidota* belongs is still very imperfectly known, and a careful study of the unnamed material at Kew would probably reveal a number of new forms in the discrimination of which the correlation of characters innate in the pseudobulbs, the leaves and the lip and its peculiar scurf promise to play a prominent part. This scurf evidently takes the place of the hairs which yield the sham-pollen referred to in the letterpress to plate 8949 (*M. Fletcheriana*) of this Magazine.

The origin of the specimen from which our plate was prepared cannot be traced at present; but it has been in cultivation at Kew for some time. It is grown in an intermediate house where the temperature is not allowed to fall below 10° C. (50° F.). It is treated as a pot-plant with a compost consisting of equal parts of fibrous peat and chopped sphagnum and given a liberal supply of water during the growing season.

DESCRIPTION.—A caespitose *epiphyte*, the young shoots much compressed, sheathed with 4 to 5 green acute cataphylls below the leaves; *pseudobulbs* oblong, somewhat compressed, 2 to 4 cm. by 0·7 to 1 cm. *Leaves* solitary and terminal, or two, one terminal, the other from the base of the internode forming the pseudobulb mostly smaller; blades linear-lanceolate, acute, 10 to 15 cm. by 1 to 2 cm., long-attenuated to the folded and dorsally keeled base and the deeply channelled short or long stalk. *Flowers* solitary, nodding on slender scapes, 10 to 15 cm. long, springing from the base of the pseudobulbs, with 7 or 8 appressed bracts, brownish, linear-oblong and subacute, the lower as long as, the upper shorter than the internodes. *Receptacle* linear-oblong in profile, about 1 cm. long. *Chin* linear, 6 mm. long. *Sepals* about equal, *obliquely oblong* for about 1 to 1·2 cm. from the base and 6 to 7 mm. wide and pale yellow, then rapidly attenuated into a slightly twisted brown-red flexuous tail 3 to 4·5 cm. long and, if flattened out, 1 to 1·5 mm. wide. *Petals* similar but shorter and uniformly pale yellow, the tail 2·5 to 3 cm. long, curved as shown in the figure. *Lip* 3-lobed, up to

2 cm. long, boat-shaped up to the middle-lobe with an oblong blunt callus as shown in fig. 3; middle-lobe more or less folded, if flattened out, ovate, crenulate-wavy along the margin; the whole lip very pale yellow except upwards where it is yellow and edged with red, loosely and finely granular-scurfy outside, densely scurfy or furry inside from the callus forward. *Column* about 5 mm. long, oblong, red at the top. *Anther* subglobose. *Pollinia* in unequal pairs, clavate, yellow.

DISTRIBUTION.—Western Andes of Colombia and Ecuador from 1,800 to 2,400 m., probably also in Western Venezuela. O.S.

Fig. 1, part of a plant, nat. size; 2, a flower with one of the sepals and one of the petals removed, nat. size; 3, lip, somewhat flattened out, $\times 2$; 4, column, passing below into the chin, $\times 4$; 5, anther-cap, $\times 4$; 6, pollinium, $\times 12$.

TAB. 9066.

FRITILLARIA ORANENSIS.

North Africa.

LILIACEAE. Tribe TULIPEAE.

FRITILLARIA, Linn. ; *Benth. & Hook. f., Gen. Plant.* III. 817 ; *Engl. in. Engl. & Prantl, Nat. Pflanzenf.* II. 5. 62.

Fritillaria oranensis, *Pomel, Nouv. Mat. Fl. Atl.* 253 (1874) ; cum *F. messanensi*, Raf., et *F. hispanica*, Boiss., comparanda, ab utraque perigonio late eximie campanulato, praeterea ab illa statura graciliore, foliis summis plerumque dissitis, ab hac tepalis magis inaequalibus atropurpureis extra magis minusve viridi-vittatis distincta.—Batt. in *Bull. Soc. Bot. France*, XXVII. 165 (1880) ; *Gard. Chron.* XIII. 340, fig. 62 (1880) ; Batt. & Trab., *Fl. Alger. Monoc.* 73 (1895) ; Murbeck, *Contr. Fl. N.O. Afr.* III. 22 (1899) ; Pitard, *Expl. Sc. Marocco* 104 (1913).

Syn. *F. Meleagris*, Desf. *Fl. Atl.* I. 293 (1798), non Linn.

F. pyrenaica, Munby, *Fl. Alger.* 35 (1847), non Linn.

F. montana, Munby, *Cat. Alg. Pl. in Hanot. & Letourn., La Kabylie I.* (1872), non Hoppe.

F. messanensis, Letourn., *Cat. Alger. Pl.* 59 (1859), non Rafin.

F. lusitanica var. *algeriensis*, J. G. Baker in *Journ. Linn. Soc.* XIV. 261 (1875).

F. Munbyi, J. G. Baker in *Gard. Chron.* VII. 45 (1877).

The difficulty of describing correctly the shapes and the colours of the perigones of *Fritillaria* and the even greater difficulty of preserving them adequately in dried specimens has much hindered the discrimination of the more intimately related forms of the genus. The obvious remedy is to depict as many of them as possible in their natural colours from living material of known origin. We have therefore availed ourselves with pleasure of the opportunity of including in these pages a portrait of a fair representative of the only North African fritillary. For this we are indebted to Lady Beatrix Stanley of Sibbertoft Manor, Market Harborough, Leicester, who placed at our disposal one of several specimens raised from bulbs which her brother, the Marquis of Headfort, had collected on the edge of the cedar forest of Jebel Meddad near Teniet el Had (about

2° E. by 36° 10' N.), Algeria, at 1,260 m. in April 1923. Lady Beatrix grew the plants in pots in her conservatory, where they flowered early in March of last year.

F. oranensis has been known since the early days of the exploration of Algeria, when in 1798 Desfontaines recorded it from the Atlas Mountains under the name *F. Meleagris*. As may be seen from the synonymy given above, it was subsequently referred to four more species, until in the seventies A. Pomel and J. G. Baker came independently to the conclusion that it should be recognised as a distinct species. Of the species mentioned three are too different to require consideration in this place. *F. messanensis*, however, and *F. lusitanica*, as far as it covers Baker's variety *hispanica*, that is the *F. hispanica* of most authors—and to these might be added *F. neglecta*—are in a different position. In the herbaria they are so much alike that they are easily mistaken; but these are our comments on them. *F. messanensis** is a sturdier plant than *F. oranensis*, with the uppermost leaves nearly always opposite or in whorls of three and with the flowers on the whole larger (3 to 4 cm. long) and of the shape of an elongated bell whose points, the tips of the tepals, connive at first and then become slightly recurved. The colour of the perigone is described by Gussone in his *Flora Sicula* (1842) as variously blackish-purple on the outside with a dull greenish-yellow longitudinal band, and as dull green with darker veins but without tessellation on the inside. Lojacono Pojero in his *Flora Sicula* (1908) confirms this description, merely adding that the tepals are variously checkered with black. In the dried specimens there is, however, generally no trace of this checkering to be seen, whilst the greenish bands stand out well from the dark ground-colour. *F. messanensis* inhabits a number of isolated stations in Sicily (near Messina),

* Of the figures published as representing *F. messanensis* those in Reichenbach's *Icones Florae Germanicae* (Vol. X., figs. 981 and 982) depict *F. neglecta*, whilst those in *Horticole Belgique*, Vol. I. and in Fiori & Paoletti's *Flora d'Italia* are copies of them. A further figure in the *Gardeners' Chronicle* of May 30, 1885 (fig. 156), drawn from a specimen received from Backhouse's nursery in York is very doubtful, but a specimen in the Churchill collection at Kew from the same source and received under the same name in 1882 is to all appearances *F. neglecta*. It shows practically none of the checkering so conspicuous in the printed figure.

in Calabria, in the Ionian island Leucas, the Peloponnesos (Malevos Mountains) and in Crete. In the north-western and western parts of the Balkan Peninsula it is represented by a slightly different form, Parlatore's *F. neglecta* (including *F. gracilis*), coloured figures of which may be found in Reichenbach's *Icones Florae Germanicae* (Vol. X. figs. 981 and 982). It is a smaller plant than *F. messanensis*, with the upper leaves nearly always scattered, with the straight tepals slightly diverging upwards, more rounded at the tips, rather greenish-brown than purple and often edged with a rose-purple or rose border. There is finally *F. hispanica* to consider. This is depicted in Willkomm's *Illustrationes Florae Hispanicae* (II. t. 95). It has the leaves scattered, a perigone obovate-oblong in profile with maroon-purple tepals with rather incurved than straight tips, usually marked with a greenish-yellow median band. It is confined to the southern and central provinces of Spain. From all these forms our species stands out by its comparatively wide and short typically bell-shaped flowers with their recurved tepal-tips. Like our common fritillary it prefers moist ground, and it ranges within its area, which extends from Jebel Dersa near Tetuan in Morocco through Algeria to Tunis, from the coast hills to the slopes of the Atlas, flowering in February or March. Its upper limit lies within the zone of annual snow-fall; but whether our plant is really hardy under the climatic conditions of this country has still to be seen. The sombre beauty of its shapely flowers deserves the experiment.

DESCRIPTION.—*Bulb* 1·2, to 2, rarely 2·5 cm. in diameter, of three or four very fleshy apically truncate scales (see fig. 7). *Flowering stems* slender, 15 to over 20 cm. high. *Basal leaves* with a lanceolate to oblong or elliptic-oblong blade, 3 to 7 cm. by 1 to 2 cm., attenuated into a slender stalk, 3 to 4 cm. long, whose base is widened into a delicately membranous sheath, embracing the bulb, the basal leaves withered at the time of flowering; *stem-leaves* 8 to 10, obliquely erect or curved or the uppermost quite erect, *all scattered or very rarely the uppermost*

two or three approximate in pairs or whorls, linear to linear-lanceolate, acute or the broadest almost obtuse, 5 to 9 cm. by 4 to 10 mm., slightly glaucous. Flowers solitary, nodding, about 3 cm. long and up to 2.5 cm. wide, bell-shaped from a squat, but not angular base with the tips of the tepals recurved. Outer tepals oblong, 0.8 to over 1 cm. wide, more or less blunt, dark livid-purple, on the outside usually with a dull green median band and covered with a glaucous bloom, greenish inside, in the upper half with purplish veins rising from the dull purple base, rarely with traces of checkering; nectary oblong, to over 1 cm. long, green. Inner tepals obovate, 1.2 to 1.5 cm. wide, otherwise like the outer. Filaments minutely papillose, 1 cm. long; anthers 0.5 cm. long. Pistil as shown in fig. 6. Capsule to over 2 cm. long, prismatic-obovoid.

DISTRIBUTION.—North Africa from North-west
Morocco to Tunis. O.S.

Fig. 1, flowering stems, nat. size; 2, longitudinal section of a flower, nat. size; 3, outer tepal seen from within, nat. size; 4, inner tepal seen from within, nat. size; 5, stamens, $\times 2$; 6, pistil, $\times 2$; 7, bulb at maturity (unusually large), nat. size.



TAB. 9067.

SMILAX EXCELSA (♀).

Orient.

LILIACEAE. Tribe SMILACEAE.

SMILAX, Linn. ; *Benth. & Hook. f., Gen. Plant.* III. 763 ; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 88 ; *A. DC., Mon. Phan.* I. 45.

Smilax excelsa, Linn., *Spec. Plant.* 1029 (1753) ; *S. divaricatae*, Sol. ex Seub., proxima, sed ramis spinosis vix quadrangulatis, quamvis lineis elevatis notatis, creberrime albo-punctatis, foliis paulo tenuioribus ad margines saepe minute calloso-scaberulis, petiolis paulo brevioribus distincta. A *S. canariensi* quacum saepe comparata ramorum indole et foliis pro rata latioribus saepe cordatis tenuioribus minime coriaceis punctis lineolisque translucidis notatis ad margines nec induratis nec laevissimis distat. — *M. Bieb., Fl. Taur.-Cauc.* II. 420 (1808) ; *Ledebour, Fl. Ross.* IV. 129 (1853) ; *A. DC., Mon. Phan.* I. 73 (1878) ; *Boiss., Fl. Or.* V. 342 (1884) ; *Velenovsky, Fl. Bulg., Suppl.* I. 266 (1898) ; *Adamovic in Engl. & Drude, Veget. Erde*, XI. 404, t. IX. (1909) ; *Tichomirow in Bull. Soc. Imp. Nat. Mosc.* 1912, 401 ; *Bean, Trees & Shrubs Brit. Isl.* ed. 3, II. 516 (1921).

This noble liane is one of the striking features in the lower sylvan belt of the southern littoral of the Caspian Sea and throughout the Caucasus and the Pontic ranges as far as the Sea of Marmora. Farther west it reappears in isolated areas in Thrace and in southern and eastern Bulgaria, often accompanied, as in its Asiatic home, by the grape-vine. In Ghilan I have seen it climbing into the crowns of the tallest trees, garlanding their boughs and hanging down in long swaying festoons. Elsewhere it throws a smothering mantle of glistening leaves over large thickets of trees and shrubs. In the forests of Transcaucasia it is according to Tichomirow sometimes also associated with the bracken, adding an impassable wall on the ground to the tangle overhead. Adamovic has reproduced an instructive photograph of a smilax-covered jungle near Varna on the Black-Sea coast in his "Vegetations Verhältnisse der Balkanländer" (see *Vegetation der Erde*, l.c.), and so dense, Velenovsky tells us, is the matting of smilax and grape-vine in the island of Maçkur

in the Tundza river near Philippopol that it becomes impenetrable save for the wild pheasant which breeds in it. Nor does our smilax shun altogether open land; but there it has to trail on the ground and to ramble among the herbàge. The plant was known to Tournefort who described it as "*Smilax orientalis, sarmentis aculeatis, excelsas arbores scandens, foliis non spinosis.*" Philip Miller (1752) enumerates it among the species grown in England, but like Linnaeus he gives Syria erroneously as its home. *S. excelsa* is one of the most typical relicts of a more or less subtropical and moisture-loving flora which in preglacial times, and in fact far back in the tertiary period, stretched across South Europe and West Asia and which has left its traces in many scattered and isolated species throughout that area and has locally survived even in still unbroken associations on the southern shores of the Black Sea and in the forests of the Caucasus and the Perso-Caspian Provinces. But it is at the western end of that old and now completely shattered belt, in the Azores and the Canaries, that we find the nearest allies of our species, namely *S. divaricata** and *S. canariensis*. *S. divaricata* is indeed so similar to *S. excelsa* that A. de Candolle, the monographer of the *Smilaceae*, merged it in the latter. It may, however, be distinguished by its stems, which are sharply four-angled

* The use of the name *S. divaricata* in this place requires explanation. It was given by Solander (in MS.) to a smilax collected by Masson in the island of S. Miguel in the Azores in 1778. This name was taken up by H. C. Watson and applied to a plant obtained by him in the neighbouring island of Pico in 1842 (in Lond. Journ. Bot. 1844, 608). Moritz Seubert when dealing in his "Flora Azorica" with a smilax collected by C. F. Hochstetter in Pico in 1838 accepted Watson's identification of the Azores species as correct, but recognizing in it, as he thought, the obscure *S. tetragona* which the younger Linnaeus had described from a plant of unknown origin grown in the Botanic Garden at Upsala he substituted Linnaeus's name *tetragona* for Solander's *divaricata*, adding at the same time a fuller description from Hochstetter's material. Soon afterwards the plant was collected by T. C. Hunt, British Consul in the Azores, in S. Miguel. Then in 1870 Watson in his contribution to Godman's "Natural History of the Azores" transferred his own Pico plant and Seubert's *S. tetragona* to *S. canariensis* although with some reserve, and the description he gave now points actually to *S. canariensis*. A. de Candolle in his monograph of the *Smilaceae* thought to solve the problem which had become thus confused by making Watson's plant provisionally a variety of *S. canariensis* which he named *divaricata*, accepting at the same time Watson's earlier identification of his plant from Pico with that of Masson's from S. Miguel, whilst he referred Hochstetter's and Hunt's plants to *S. excelsa*. To my mind there can be no doubt that the Azores plant of Masson, Hochstetter and Hunt—I am not so sure about Watson's—represents a distinct species, and as the original *S. tetragona* of Linnaeus fil. has since turned out to be a *Basellacea* (*Boussingaultia*?) I have restored Solander's name coupling it with Seubert's description of *S. tetragona*.

in the upper part and altogether devoid of the numerous white dots caused in *S. excelsa* by the air-spaces under the stomata, and by its slightly more rounded and firmer leaves with their perfectly smooth margins and, on the whole, longer petioles. *S. canariensis*, of which there is a good figure in Webb and Berthelot's "Histoire Naturelle des Isles Canares" (Phytogr. III. t. 225), differs still more in its uniformly smooth pale green stems with small thorns at the base only, and in its differently shaped smooth- and hard-edged leathery leaves which are devoid of the pellucid dots and streaks which may be observed in *S. excelsa* and *S. divaricata* and which are due to the presence of raphid-cells. The berries are moreover said to be black and not red as in *S. divaricata*. Buxbaum (1728) states that in Thrace the young shoots are eaten like asparagus, whilst Tichomirow informs us that some of the Caucasian peoples scald them as well as the young leaves and make them into a salad. They also use the roots medicinally and partly as a substitute for sarsaparilla.

The plant from which our plate was prepared was raised at Kew from seed received from the nurseries of W. Müller at Nocera near Salerno in 1909. It was stated to have come from Turkestan, which in this case no doubt means Turcomania, where, probably on the Mazanderan frontier, *S. excelsa* is known to occur. The plant is perfectly hardy at Kew and a vigorous grower. It fruits abundantly every year, but as there is no male plant in the Gardens, fertilisation is evidently effected by the pollen of one of the other species growing around it. It is trained on stakes and forms an unshapely tangled mass of branches. It would be worth while to try it under conditions which give it a chance to develop freely its propensities as a liane.

DESCRIPTION.—A tall dioecious climber; stems terete with 4 raised decurrent lines, dark green with numerous white dots, more or less thorny, thorns straight, up to 7 mm. long and up to over 3 mm. wide at the base, or the smaller weaker and slightly curved. Leaves tardily deciduous; blades broad-ovate from a slightly cordate or broadly rounded

and almost truncate, rarely shortly cuneate base, sharply acute with a terminal mucro, very variable in size, mostly 4 to 6 cm. by 3 to 5 cm., of robust branches up to 12.5 by 13 cm., membranous, 7-nerved from the base, the nerves on the back sometimes slightly rough downwards, the parenchyma showing here and there pellucid dots and streaks, the margins thin, smooth or more or less rough from minute callosities; leaf-stalks 7 to 12 mm. long, sheathing up to $\frac{1}{3}$ or $\frac{1}{2}$ of their length, bearing above the sheath a pair of tendrils of varying length (to over 5 cm.). Peduncles as long or almost as long as the leaf-stalks. Umbels few- to 10-flowered; bracts subulate, 1.5 mm. long; pedicels of the male flowers up to 7 mm. long, of the female much shorter, but growing to the same length ultimately. Male flowers: bud blunt, obovoid-oblong, 5 to 7 mm. long; tepals oblong, pointed or somewhat blunt; anthers oblong, 1.5 mm. long, filaments 3 mm. long. Female flowers: bud oblong, very blunt, 4 to 5 mm. long; tepals linear to oblong-linear, subacute; staminodes 6, filiform; ovary ovoid-oblong, 2 mm. long; stigmas oblong, recurved. Berries red, 8 to 10 mm. in diameter; seeds mostly 3.

DISTRIBUTION.—From the southern shores of the Caspian Sea through the Caucasus (here up to 1,200 m.) and the Pontic ranges to Thrace and Bulgaria. O.S.

Fig. 1, a flowering female branch, nat. size; 2, a flower, $\times 4$; 3, a tepal with a staminode, $\times 4$; 4, a flower in longitudinal section, $\times 4$; 5, a fruiting branch with a mature leafy branch on the left, nat. size; 6, cross section through a berry, $\times 2$.

TAB. 9068.

CHIONODOXA SIEHEI.

Asia Minor.

LILIACEAE. Tribe SCILLEAE.

CHIONODOXA, Boiss.: *Benth. & Hook. f., Gen. Plant.* III. 813; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 68.

Chionodoxa Siehei, Stapf (spec. nov.): cum *C. gigantea*, Whittall, comparanda, sed robustior, altior, magis floribunda, segmentis perigonii in alabastro ad tubi os constricti brevioribus late oblongis, interioribus superne dilatatis subalatisque, antheris minoribus distincta.

When in the spring of 1877 George Maw, who was then travelling in Asia Minor for the study of *Crocus*, visited Nymph Dagħ, a mountain about 15 km. to the east of Smyrna, he saw there a *Chionodoxa* which at once took his fancy. It was out of flower at lower elevations, but, so he writes, "near the summit (1,300 m.) a great mass was met with in full splendour, forming one of the most sumptuous displays of floral beauty . . . a mass of blue and white . . . intense and brilliant." He secured a supply of bulbs, and the following February Mrs. Baker was able to paint the first flowers obtained from them in Maw's garden at Benthall, Broseley, Shropshire. She represents them as white over a large part of the base of the perigone-segments and otherwise sky-blue with a faint tinge of purple. The plant was then for unaccountable reasons identified as *C. Forbesii*,* a name which it retained in gardens for some time. The following year when stronger plants were available a plate was prepared from them for the Botanical Magazine (t. 6433), the plant being now referred to *C. Luciliae*† with *C. Forbesii* as a synonym. Curiously

* *C. Forbesii*, Baker, is a small-flowered *Chionodoxa* from the mountains near Chorzoum, (the ancient Kybira in Kabalia to the north of Lycia, about 27° N. by 29° 30' E.). It is rather like the Cretan species, and Baker's variety *idaea* of *C. Forbesii* from Mount Ida in Crete is in fact identical with the earlier *C. nana* from the same locality.

† *C. Luciliae* was discovered by Edmond Boissier in 1842 on the summit of Boz Dagħ, the Tmolus of the ancients (2,050 m.), about 80 km. east of Smyrna. He found it in full flower by the melting snow at the end of June (!) forming along with *Ornithogalum nivale* and *Scilla nivalis* perfect carpets in blue and white. He describes it as having 1-, or rarely, 2-flowered scapes 7 to 12 cm. high with bright blue-violet (!) flowers 3 to 3.2 cm. across. No white eye is mentioned nor is there one clearly discernible in Boissier's field-specimens.

enough neither the colour of the flowers nor the detail of certain analyses agrees with Mrs. Baker's sketch. However the name was generally accepted and when presently the plant by its irresistible charm conquered the fancy of all and was imported by thousands and thousands, the name *C. Luciliae* became firmly established in gardens. These wholesale importations were due to the enterprise of a Smyrna merchant, Edward Whittall, whose love of sport had taken him over much of the hinterland of Smyrna where he became familiar with the wealth and beauty of the flora, particularly of the bulbous plants, many of which he grew in his own large garden previous to their dispersal, so that his observations regarding any of them cannot be disregarded. Following some articles on *Chionodoxa* in The Garden he stated his own conclusions in a contribution to the issue of that journal of April 20, 1889. Space forbids to enter fully into the questions which he raised there and continued to raise in his correspondence with Kew. It must suffice to point out that from his extensive field-knowledge of *Chionodoxa* and from his equally extensive experience in their cultivation he had come to the conclusion that there were in his district, apart from *C. sardensis*, whose status as a species was hardly challenged, certainly three kinds of *Chionodoxa*, namely Maw's plant from Nymph Dagh, that is the *C. Luciliae* of gardens, then one commonly found on Boz Dagh or Tmolus which he proposed to call *C. Tmoli** and finally his *C. gigantea* to which I have referred in the Latin diagnosis. *C. Tmoli*, he says, is a dwarfer plant than Maw's *C. Luciliae*, more brilliant in colouring, with the eye large and the blue tips of the perigone-segments exceedingly vivid, and moreover with bulbs not larger than a pea. He supports his claim for a distinctive name for the Tmolus plant by a reference to its very peculiar ecology. "*C. Tmoli*", he writes, is found in most peculiar situations, generally in deep gorges which are filled to a great depth with drift snow. This gets worn away in April and May by the action of the water underneath and forms vast pearly white domes

* Whittall writes actually *Tmolusi*, but it would be ill-placed pedantry to perpetuate the grammatical mistake of a man who was not familiar with Latin. I have no doubt that he was correct in segregating his *C. Tmoli* of the inner Taurus ranges (Boz Dagh and Baba Dagh or Cadmus) from the *C. Luciliae* of the gardens: but I am not quite sure that *C. Tmoli* is actually Boissier's plant.

above, in some cases 50 to 60 ft. high, under which, almost covered by the ice-cold water, your eye is enchanted with the sight of thick masses of beautiful blue and white flowers. In fact *C. Tmoli* is the only one of the genus that seems to like such damp quarters" (letter to the Director of Kew). As to *C. gigantea*, this came also from the Tmolus, but from its lower eastern end above the town of Allashehr and probably from an altitude of not more than 1,000 m. He does not describe it beyond pointing out the very large size of the flowers, but insists on its distinctiveness which appeared to him so striking that at times he was "tempted to believe that it was not a *Chionodoxa* at all." Specimens raised at Kew from bulbs received from Whittall as *C. gigantea* and corresponding field-specimens communicated by Whittall certainly mark the plant as distinct from Maw's plant. It has the purple-blue flowers with the small white eye in common with Boissier's original of *C. Luciliae*, but is in every respect a much bigger plant. A fair coloured figure of it may be seen in *The Garden*, vol. XLII. (1892). The plant sometimes grows taller than shown in the plate, and it is then that it resembles superficially the *Chionodoxa* portrayed in this place which, however, differs from it in its richer inflorescences, in the general colouring of the flower, in the marked constriction of the buds above the perigone-tube, in the perigone-segments being rather broad upwards, in the widening of the inner segments into lateral wings near the tips and in the shorter anthers (4 mm.).

C. Siehei was raised from bulbs received at Glasnevin in 1904 in a varied consignment forwarded by Herr Walther Siehe, then at Mersina in Cilicia. As the locality of origin was not stated I wrote to Herr Siehe, adding a tracing of the plate, and received the reply that the bulbs were collected by him in 1904 on Ala Dagħ on the north side of the pass leading from Bereketli to Farash in about 35° E. and 38° N. at an altitude of not less than 2,500 m., the geological formation being cretaceous limestone. *C. Siehei* marks thus an eastern extension of the area of the genus by about 400 km. It is certainly the largest and the most brilliant of all the chionodoxas, but it may be questioned whether it will ever surpass the exquisite charm of the common *C. Luciliae* of gardens or of *C.*

Tmoli. Mr. J. W. Besant, Acting Curator of the Botanic Garden at Glasnevin, Dublin, to whom we are indebted for the material from which the present plate was drawn, tells me that *C. Siehei* has for many years been a much admired ornament of the garden now in his charge. It is, of course, perfectly hardy and requires no other treatment than that given to other members of the genus. It flowers about the middle of March.

DESCRIPTION.—*Bulb* as in the plate, producing one to three *scapes*, each with two leaves, including the inflorescence 20 to 30 cm. high, the stoutest up to 6 mm. in diameter. *Leaves lanceolate-linear*, very long tapering downwards, with bluntish tips, 25 to 40 cm. by 1 to 1.75 cm. (if flattened out), concave, dark green. *Racemes* up to over 10 cm. long and up to 15-flowered, of the secondary scapes very much reduced, often only 1- to 2-flowered bracts delicately hyaline, subulate to filiform from a short broader base, white or blue or purple at the tip, up to over 1 cm. long, early breaking up; pedicels obliquely erect, the lowest 2.5 to 3 cm. long or somewhat longer in fruit and then hanging over. *Perigone* in bud ovoid and acute above the oblong-semiglobose dark blue tube, when quite open 3 to 3.5 cm. in diameter; outer segments oblong, subobtuse, 13 to 14 mm. by 5 mm. with a low blunt crest towards the tip; inner segments similar except towards the tip where they are laterally widened into roundish wings, all white from the base to $\frac{1}{2}$ or $\frac{1}{3}$ of their length, above, on opening purple-violet, afterwards turning blue-violet to deep blue. *Anthers*, as shown in figs. 5 and 6, 4 mm. long; outer filaments slightly longer than the inner. *Style* about 2 mm. long. *Fruit* subglobose, 6-lobed, 15 to 18 mm. in diameter. *Seeds* subglobose, up to over 2 mm. long, stipitate, stipe (indurated funicle) with a pearly-white caruncle.

DISTRIBUTION.—South-eastern Asia Minor, Ala Dagh, 2,500 m. O.S.

Figs. 1 and 2, a whole flowering plant, nat. size; 3, a full grown leaf, at the time of approaching maturity, nat. size; 4, a longitudinal section of a flower, with the perigone-segments cut off, $\times 5$; 5, outer stamens in front- and back-view, $\times 4.5$; 6, inner stamens in front- and back-view, $\times 4.5$; 7, fruits, nat. size; 8, section through an almost mature fruit, $\times 3$; 9, seeds in front- and back-view, with the pearly caruncle at the base, $\times 4$.

TAB. 9069.

ARCTOTIS ROODAE.

South Africa.

COMPOSITAE. Tribe ARCTOTIDEAE.

ARCTOTIS, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 458; *O. Hoffm. in Engl. & Prantl, Nat. Pflanzenf.* IV. 5. 308.

Arctotis Roodae, *Hutchinson in Kew Bull.* 1924, 257; arcte affinis *A. Gumbletonii*, Hook. f., sed habitu suffrutescente, foliis saepe integris vel breviter lobatis, caulinis si adsunt angustissimis basi haud dilatatis, corollis radii magis rubris aliter pictis distincta.

When dealing with *Arctotis Gumbletonii* (see Bot. Mag. t. 7796) Sir Joseph Hooker pointed out the unsatisfactory condition of the taxonomy of *Arctotis*, a genus which has given us already a number of the most beautiful plants for the decoration of our green-houses (see Bot. Mag. tt. 6835, 8162, etc.). Since then new forms have been added but no attempt has been made to revise and properly correlate the numerous forms already recorded in the literature of the genus. We are therefore in the same difficult position in which Sir Joseph found himself when proposing *Arctotis Gumbletonii* as a new species. The difficulties with which we are confronted arise not only from the meagreness of most descriptions, old and new, but also from our ignorance of the limits within which the shape of the leaves and the colour and marking of the ray-flowers fluctuate. The amplitude of fluctuation is probably considerable, but this is a question which can only be solved by observation in the field or by well directed cultivation. Meanwhile, we shall have to be satisfied with the assurance that the more recently described species cannot be identified with the Herbarium material available, a condition which certainly applies to the plant figured here. Among the older species it no doubt approaches very closely to *A. flammea*, a species

raised by Jacquin from seed received from the Cape more than 120 years ago and figured by him in his "Fragmenta Botanica." Curiously enough the species is not included in Flora Capensis and it does not seem to have been collected since. It is represented as having the cauline leaves more dilated at the base and bright orange-yellow ray-flowers with small black markings at the base. Otherwise the resemblance is very great indeed.

A. Roodae was raised in 1922 by Mr. N. E. Brown in his garden from seed received from Mrs. Rood of Van Rhynsdorp, south of Namaqualand, whence *A. Gumbletonii* came, but the specimen actually depicted is one of several which were shown last year in the Conservatory of the Royal Botanic Gardens of Kew, where they continued to flower for many weeks. They require no treatment other than that given to Cape plants generally. So far they have not produced ripe seed, whilst propagation from cuttings has proved somewhat slow and uncertain. Layering, however, might be tried with a better promise of success as it has already answered well in the case of other species of *Arctotis*.

DESCRIPTION.—A perennial herb or undershrub, up to over 30 cm. high with a short woody stem from which short woody branches rise producing loose tufts of leaves and long almost bare scapes or peduncles; the whole plant adpressedly cobwebby and greyish-green to silvery-grey. Leaves borne on slender stalks up to 9 cm. long and not or very slightly dilated at the base; blades lanceolate, oblong or ovate-oblong in outline, mostly entire or slightly or, more rarely, deeply lobed with 2–4 triangular to narrowly oblong lobes on each side, repand-dentate or denticulate, up to 9 cm. by 4 cm., more or less distinctly 3-nerved, in deeply dissected blades the lateral nerves diverging very tardily from the midrib, hence only the upper half of the blade 3-nerved. Peduncles up to 20 cm. high, usually with one or two long linear flexuose rudimentary leaves below the middle. Flower-heads nodding and globose in bud, 6–7.5 cm. across when fully open; involucral bracts of two kinds, the outer spreading, herbaceous, linear from a short firmer base, the inner firm, glabrous or nearly

glabrous, green, broad-oblong to elliptic-oblong with a large hyaline appendage, the firm part up to 10 mm. by 5–6 mm., the appendage of the innermost bracts 9 mm. by 5 mm.; torus paleaceous, the paleæ hyaline as in fig. 3. *Ray-flowers* 20–25, female (see fig. 4):—*Corolla-limb* spreading horizontally, then rolling back from the tip, up to 2·5 cm. by 5 mm., as shown in the plate, tips entire or minutely 3-toothed, *red-orange to almost blood red with a black blotch at the base*. *Receptacle* globose-obovoid, woolly, surrounded from the base and overtopped by a dense ring of stiff hairs. *Pappus* of two sets of hyaline white scales, one linear to linear-oblong, 2 mm. long, ciliate at the tip, the other (of up to 8 scales) narrowly obovate to oblong with broad rounded tips (see fig. 5). *Style* 5–6 mm. long, red; stigma-lobes spreading, linear-oblong, blunt, up to 1·5 mm. long. *Disc-flowers*, the outer hermaphrodite, the inner male. *Receptacle* and *pappus* changing centrewards, the receptacles becoming smaller and finally quite glabrous, the pappus being at the same time modified by the reduction and suppression of the large scales, in the innermost flowers consisting only of small narrowly ovate toothed scales, produced into a fine point or bristle (see figs. 7–10). *Corolla-tube* cylindric and white for 5 mm., then campanulate and yellow for 3 mm.; lobes oblong-linear with black hardened tips which in the bud form a conspicuous pentagonal top. *Anthers* 2·5 mm. long, brownish with the top of the connective inflexed and the base of the anther-cells shortly pointed. *Stigma* cylindric, 2 mm. long, microscopically papillose and minutely 2-lobed. *Fruit* not seen.

DISTRIBUTION.—Western South Africa; Cape Province, Van Rhynsdorp Division. O.S.

Fig. 1, a plant with several flower-heads, nat. size; 2, cross-section of a flower-head, nat. size; 3, paleae of the torus, $\times 8$; 4, a ray-flower with the pappus-scales taken off in front and with the ovary in longitudinal section, $\times 2$; 5, a large and two small pappus-scales, $\times 6$; 6, a small pappus-scale, $\times 6$; 7, an outer disc-flower, $\times 3$; 8, an intermediate disc-flower, $\times 3$; 9, sub-central disc-flower, $\times 3$; 10, a central disc-flower, $\times 6$; 11, anthers of a σ flower, $\times 10$.

